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EASONAL FARMWORKER POWERLESSNESS

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HEARINGS

BEFORE THE

SUBCOMMITTEE ON MIGRATORY LABOR

OF THE

COMMITTEE ON LABOR AND PUBLIC WELFARE

UNITED STATES SENATE

NINETY-FIRST CONGRESS

FIRST AND SECOND SESSIONS

ON

PESTICIDES AND THE FARMWORKER

SEPTEMBER 29, 1969

PART 6-B

Printed for the use of the Committee on Labor and Public Welfare

MIGRANT AND SEASONAL FARMWORKER POWERLESSNESS

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U.S. GOVERNMENT PRINTING OFFICE

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Part 1: Who Are the Migrants?	June 9 and 10, 1969
Part 2: The Migrant Subculture	July 28, 1969
Part 3–A: Efforts To Organize	July 15, 1969
Part 3–B: Efforts To Organize	July 16 and 17, 1969
Part 4–A: Farmworker Legal Problems	Aug. 7, 1969
Part 4–B: Farmworker Legal Problems	Aug. 8, 1969
Part 5–A: Border Commuter Labor Problem	May 21, 1969
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Part 6–A: Pesticides and the Farmworker	Aug. 1, 1969
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MIGRANT AND SEASONAL FARMWORKER POWERLESSNESS

(Pesticides and the Farmworker)

MONDAY, SEPTEMBER 29, 1969

U.S. SENATE,
SUBCOMMITTEE ON MIGRATORY LABOR
OF THE COMMITTEE ON LABOR AND PUBLIC WELFARE,
Washington, D.C.

The subcommittee met at 9:30 a.m., pursuant to recess, in room 4232, New Senate Office Building, Senator Walter F. Mondale (chairman of the subcommittee) presiding.

Present: Senators Mondale (presiding), Kennedy, Cranston, Murphy, and Schweiker.

Committee staff members present: Robert O. Harris, staff director; and Boren Chertkov, counsel to the subcommittee.

Senator MONDALE. The hearing will come to order. Our first witnesses will consist of a panel from the United Farm Workers Organizing Committee, Mr. Cesar Chavez, Director, Mr. Manuel Vasquez, and the general counsel, Mr. Jerome Cohen.

Will you please come to the witness table. Perhaps you will want to introduce them, Senator Cranston.

Senator CRANSTON. Mr. Chairman, I take great pleasure in presenting to this committee my friend Cesar Chavez, a man whom I have known for more than 20 years in California, who I consider one of the outstanding citizens not only of my State but of our Nation, a man who is leading his people in the great tradition of Mahatma Gandhi and Martin Luther King. Cesar Chavez has had a unique impact on California and on the United States. Countless others have made studies and written books to dramatize the plight of the American farmworker. Countless others have called for legislative reforms and governmental assistance to alleviate the poverty and neglect of these people at the very bottom of our economic life.

Cesar Chavez came to the California farmworker with a different message: He says that the way to improve their lives and to give their children a future was not through the debilitating paternalism of more welfare programs nor the tokenism of begrudged governmental health and safety protection.

The answer, he said, was to organize and negotiate contracts with the growers. He told farmworkers it is the growers, not the Government, they must talk to.

Beyond the contract, Cesar Chavez told people living in rural poverty that they must work together to develop social programs

that they themselves control, that they must be the generals in their own war on poverty.

Thus, many of his critics accused Cesar Chavez of being a social reformer instead of just a comfortable and predictable union organizer, forgetting that every great labor leader has worked to reform society.

Mr. Chairman, in an age when the so-called "forgotten American" has a bumper strip which reads "I Fight Poverty— I Work", there is no one in our Nation who works harder for less money than the farmworker and no one whose fight against poverty is more in the American tradition of initiative and self-help than Cesar Chavez and his followers.

In an age when most reformers call for compensatory programs and stepped-up Government assistance for the poor, Cesar Chavez has insisted that rural people win their own fight for decent wages and working conditions at the bargaining table.

In an age when protest stems from skeptical disbelief, Cesar Chavez's cause is grounded in personal and deeply religious conviction.

Mr. Chairman, I am pleased to welcome Cesar Chavez before this committee.

Senator MONDALE. Thank you, Senator Cranston, for that very fine introduction.

I wish to join in welcoming Mr. Chavez here today. I agree with Senator Cranston that he is one of the truly remarkable men of our time, and we are most pleased that he could be with us here this morning.

This morning we continue the fifth in a series of hearings on migrant and seasonal farmworker problems. The underlying theme of our hearings is powerlessness, and in this particular series of hearings we are investigating pesticides and the farmworker.

In past hearings we have endeavored to obtain a broad introduction to various problem areas by hearing farmworkers themselves tell of their own lives, their own problems.

We have heard testimony from both community and union organizers on the obstacles to their self-help efforts to improve their own situation.

We have explored what really happens to the men, women and children that are confronted with the severe economic and social stress of migratory farm work.

We have also heard testimony on the border commuter labor problem and the severe economic depression created by the surplus of desperately poor people forced to accept substandard living and working conditions along our borders with Mexico.

Last month we heard testimony on the legal problems most often faced by farmworkers, and the pervasive problems of legal and social discrimination.

Today we are continuing our discussion of the effects of pesticides on farmworkers. On August 1, 1969, we had 1 day of testimony in which we sought to determine what the short and long-range effects

are, if any, of the use of pesticides on farmworkers who apply them, or work in the fields soon after they have been applied; whether in view of increasing production, and the proliferation of various new pesticides, adequate funds are being devoted to research on occupational hazards to farmworkers; and what government programs exist for protection of the farmworker from pesticides and whether they are adequately funded and enforced.

Our hearings today and tomorrow will be devoted to a further examination and discussion of evidence presented at our August 1 hearing.

At that hearing, Mr. Jerome Cohen, Counsel for the United Farm Workers Organizing Committee, testified that aldrin was present on grapes in amounts above accepted tolerance levels.

After Mr. Cohen had testified, and during the testimony of Dr. C. C. Johnson, Chief, Consumer Protection and Environmental Health Services of HEW, I was handed a laboratory report from the C. W. England Laboratories in Washington, D.C., which showed that grapes in the Washington area had 18 parts per million of aldrin.

In response to a question from me, Dr. Johnson said that the accepted tolerance level for aldrin on grapes was 0.1 parts per million, and that the laboratory results therefore showed aldrin residues 180 times the human tolerance level.

At that time I gave Dr. Johnson the England laboratory report, and asked the FDA to investigate the matter.

Thereafter, the Consumer Protection and Environmental Health Service, through the Food and Drug Administration, tested a sample of table grapes for pesticide residues.

The results of these tests and other relevant materials were sent to me by Dr. Johnson on August 12, 1969.

The FDA report indicated that of the 60 samples of grapes tested (48 from stores in four major cities, and 12 from railroad cars in California), no pesticide residues above tolerance levels were found and no aldrin residues were found at all.

On August 12, Senator George Murphy, a member of our subcommittee, placed the FDA's findings in the Congressional Record. A copy of Senator Murphy's statement will be included in the hearing record at the close of my statement.

In his statement on the floor of the Senate, Senator Murphy included affidavits from Anthony Bianco, said to be the grower of the grapes tested by England, and from the company that applies all of Bianco's pesticides. Both affidavits stated that aldrin had not been used on Bianco grapes any time in the last 6 years.

Senator Murphy submitted a statement from the Kern County (California) commissioner of agriculture that aldrin had not been used on grapes in Kern County in 2 years. He also submitted a laboratory report which showed traces of aldrin on Bianco's grapes.

Senator Murphy, in this statement, said that:

> The grapes presented to the England Laboratory had somehow achieved strange qualities which I find very difficult to explain. And it seems possible that a subcommittee of the U.S. Senate has been the victim of duplicity.

Senator Murphy went on to say that:

If this be the case—this tactic on the part of the United Farm Workers Organizing Committee is a vicious type of deceit. . . .

He further said that:

I believe they have gone too far in this case and that this deplorable story will show the UFWOC effort up for what it really is.

On August 19, Senator Murphy wrote me a letter requesting that the subcommittee reconvene its hearings on pesticides, noting that:

The FDA and other materials appear to point to an attempt to mislead the subcommittee by presentation of false evidence.

Subsequently, the subcommittee learned that Safeway Stores, Inc., the store from which it is alleged that the first sample of grapes was taken for England Laboratory testing, commissioned three different chemical laboratories, including the C. W. England Laboratories, to run pesticide residue tests on their grapes.

The subcommittee learned further that Safeway subsequently reported the results of these tests to the Food and Drug Administration.

On September 9, I wrote both Safeway Stores, Inc., and the FDA requesting that they immediately submit to the subcommittee any information they had concerning these additional tests, including explanations and copies of any test results. Copies of these letters will appear in the hearing record.

Safeway Stores, Inc., cooperated fully with this request and submitted their test information at once. The FDA has made no response to my request.

Safeway's report to the subcommittee indicated the following: On August 2, samples of Bianco grapes were taken from the Safeway Store's warehouse in Landover, Md., by the Eastawai Research Laboratories in Baltimore and the C. W. England Laboratories in Washington.

Additionally, on August 6, 1969, Safeway commissioned C. W. England Laboratories to test grapes in railway cars at the Safeway warehouse.

On August 7, 1969, Safeway commissioned the Strasburger & Siegel Laboratory in Baltimore to sample and test grapes from their Landover, Md., warehouse.

The reports of these tests are attached to this statement and will be included in the record. They all show that there were pesticide residues on the grapes.

In addition to the initial England test showing 18 parts per million of aldrin, England found 0.65 parts per million of aldrin on the grapes sampled on August 2, 1969, and the Eastawai Lab found 17.6 parts per million of aldrin on the grapes tested on that same date.

The August 6 England test of grapes from rail cars at the Safeway warehouse showed 0.32 parts per million of aldrin.

The August 7 Strasburger & Siegel test of grapes at the Safeway warehouse found no aldrin residues.

Because of an apparent conflict between the preliminary laboratory findings of pesticide residues and a California Department of Agriculture report that these pesticides had not been applied, Safeway then asked the laboratories to recheck their results.

Two days later, Safeway notified the supplier to temporarily suspend shipments of grapes until the test results were clarified. Safeway further explored with the labs the possibility of confusion between sulphur and aldrin.

Thereafter, Safeway notified the grape supplier to resume shipments. The full chronology of actions taken by Safeway will be made a part of the hearing record.

The purpose of this week's hearings is to determine, on the basis of information submitted to the subcommittee and the testimony to be presented by the witnesses, answers to the following questions:

Is there any truth to the charge that the union presented false evidence in an attempt to mislead the subcommittee?

Were the England and Eastawai Laboratory results which showed pesticide residues far in excess of human tolerance levels accurate?

How can the apparent conflicts between FDA results and the results of England and Eastawai Laboratories be explained?

Was the chemical sulphur mistakenly identified as aldrin in any of the laboratory tests?

What pesticides are being used by California grape producers?

What precautions are being taken by California grape producers to protect farmworkers from pesticide injuries and poisoning?

What sampling and testing procedures were used by the Food and Drug Administration?

How are tolerance levels for pesticide residues established by the FDA and what do they mean?

Does the FDA have the ability and competence to protect the consuming public against the threat of dangerous pesticide residues on produce sold in grocery stores?

What actions did FDA take, and what advice did they give, after they received the various laboratory reports showing pesticide residues in excess of the tolerance levels on table grapes?

Why has not the FDA responded to my letter of September 9, 1969, requesting that they submit to the subcommittee any information they had regarding the additional laboratory tests of table grapes, including explanations and copies of any test results?

Whether the records of pesticide applications by California table-grape growers are public information available to all interested parties.

Finally, and most importantly, after answers to some of these specific questions growing out of Senator Murphy's request that these hearings be reopened, the subcommittee will seek to reestablish its focus on the most important inquiry of all: what the effects of pesticide applications are on the farmworkers who apply them or work in the fields shortly after they have been applied.

(The documents referred to follow:)

[From the Congressional Record, Aug. 12, 1969, p. S. 9868]

ALDRIN RESIDUE ON TABLE GRAPES

Mr. MURPHY. Mr. President, I think it is important that the RECORD show, and the American people be aware of, what seems to be a shocking attempt to mislead the public by the presentation of false evidence to the Subcomittee on Migratory Labor.

On August 1, 1969, Jerry Cohen, general counsel for the United Farm Workers Organizing Committee—UFWOC—appeared before that subcommittee and testified that two bunches of Thompson seedless grapes contained quantities of the chemical Aldrin which were 180 times the established tolerance level for human beings. Mr. Cohen submitted a laboratory report from the C. W. England Laboratory, of Washington, D.C., showing an Aldrin content of 18 parts per million compared with the legal tolerance level of .01 parts per million.

The England Laboratory, in later comments to the news media, said that the grapes they tested had been presented to them by a representative of the UFWOC and were not purchased or obtained from any market directly by the laboratory.

After this testimony the Food and Drug Administration, at the request of subcommittee Chairman MONDALE, has conducted tests of table grapes in markets across the country. It obtained 60 sample, including 48 from retail outlets in New York, Chicago, Los Angeles, and the Washington-Baltimore area. It also sampled 12 carlots in the San Francisco market.

The Food and Drug Administration report shows there was no Aldrin residue on any grapes. It also shows there no chemical residue of any nature on any grape sample that approached the human tolerance level. I ask unanimous consent that the report of the Food and Drug Administration be printed in the RECORD.

There being no objection, the report was ordered to be printed in the Record, as follows:

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
PUBLIC HEALTH SERVICE,
CONSUMER PROTECTION AND ENVIRONMENTAL HEALTH SERVICE,
Washington, D.C., August 12, 1969.

Hon. GEORGE MURPHY,
U.S. Senate,
Washington, D.C.

DEAR SENATOR MURPHY: As a result of material presented at the August 1, 1969, hearing before the Subcommittee on Migratory Labor of the Committee on Labor and Public Welfare, the Consumer Protection and Environmental Health Service through the Food and Drug Administration instituted a survey of pesticides on table grapes. The results of that survey and other relevant materials are attached.

Please be assured of our continuing concern in all aspects of this important public health problem.

Sincerely yours,

CHARLES C. JOHNSON, Jr.,
Assistant Surgeon General, Administrator.

[Memorandum from the Department of Health, Education, and Welfare, Public Health Service, Consumer Protection and Environmental Health Service, Food and Drug Administration, August 8, 1969]

To: Mr. C. C. Johnson, Jr., Administrator, CPE.
From: J. K. Kirk, Associate Commissioner for Compliance.
Subject: Results of Table Grape Survey—August 1969.

A total of 60 samples of various types of table grapes; i.e., Thompson Seedless, Ribier, Cardinal and Red Malaga, were collected and analyzed for pesticide residues. The analytical procedure used for obtaining these results was multi-residue methods for organic chloride compounds (aldrin, dieldrin, DDT, etc.) and organophosphate compounds (parathion, ethion, etc.), using gas liquid chromatography.

Forty-eight (48) of these samples were from retail stores (Washington-Baltimore; Los Angeles, California; New York, N.Y.; Chicago, Illinois), including the Safeway store, 1730 Hamlin Street, N.E., Washington, D.C., and Giant Food Store, 4900 Annapolis Road, Bladensburg, Maryland.

Summary of Results.—None of the samples contained pesticide residues above tolerance, and all residues were substantially below tolerance. No residues of aldrin were found. Pesticide residues found:

Pesticide	Range	Tolerance
Kelthane	0 to 1.4 p.m	5.0 p.p.m.
DDT	0 to 0.29 p.p.m	7.0 p.p.m.
DDE	0 to 0.01 p.p.m	None (metabolite of DDT).
Dieldrin	0 to trace [1]	0.1 p.p.m.
Diazinon	0 to trace [1]	0.75 p.p.m.
Ethion	0 to 0.29 p.p.m	2.0 p.p.m.

[1] Trace indicates less than 0.01 p.p.m.

Twelve (12) samples were obtained from packers located in the San Francisco, California, area.

Summary of Results.—None of these samples contained pesticide residues above tolerance. and all residues were substantially below tolerance. No residues of aldrin were found. Pesticide residues found:

Pesticide	Range	Tolerance
Kelthane	0 to 0.43 p.p.m	5.0 p.p.m.
DDT	0 to 0.04 p.p.m	7.0 p.p.m.
DDE	0 to 0.02 p.p.m	None (metabolite of DDT).
Diazinon	0 to 0.02 p.p.m	0.75 p.p.m.
Ethion	0 to 0.28 p.p.m	2.0 p.p.m.
Tedion	0 to 1.7 p.p.m	5.0 p.p.m.

Attached is a listing of samples, grower, and individual results of analysis. Also attached are the results of our pesticide analysis on grapes (total) and California grapes for FY 1967, FY 1968 and July 1, 1968 to March 30, 1969.

A survey of pesticide residues on table grapes grown in Southern California and Arizona was conducted during July 1969 and these results are also attached. None of the samples from this survey contained pesticides above tolerance level. Pesticide residues found:

Pesticide	Range	Tolerance
DDT	Trace [1] to 0.06 p.p.m	7.0 p.p.m.
DDE	0 to 0.03 p.p.m	None (metabolite of DDT).
Carbaryl	0 to 0.4 p.p.m	10.0 p.p.m.

[1] Trace indicates less than 0.01 p.p.m.

TABLE GRAPE SURVEY

Retail level Sample No.	Grower or packer	Parts per million						
		Kelthane	DDT	DDE	Dieldrin	Diazinon	Ethion	Tedion
	TOLERANCE, p.p.m.	5.0	7.0	None	0.1	0.75	2.0	5.0
118-093C	El Rancho Farm, Arvin, Calif.	0.86						
118-094C	do	0.17						
118-164C	Guimarra Vineyards Corp., Bakersfield, Calif.	T						
118-165C	do	T						
118-095C	do		T	T				
118-096C	do	0.31						
116-470C	El Rancho Farms, Arvin, Calif.	T						
117-216C	Unknown	0.11	T	T				
116-471C	El Rancho Farms, Arvin, Calif.	T	T	T				
117-217C	Table of Grapes, Table of Grapes, Calif.	T			T	T	0.08	
117-950C	El Rancho Farms, Arvin, Calif.	0.66						
117-949C	do	0.17						
222-182C	John J. Kovacevich, Inc., Arvin, Calif.	0.09						
196-570C	do	0.0						
222-183C	Guimarra Vineyards Corp., Bakersfield, Calif.	0.08						
222-184C	do	0.05						
222-185C	do	0.19						
222-186C	do	0.07						
222-187C	Guimarra Vineyards Corp., Bakersfield, Calif.	0.03						
222-188C	do	0.17						
222-189C	do	0.04						
222-190C	do	0.12						
222-191C	do	0.04						
196-569C	The William Mosesian Corp., Lamont, Calif.	0.15						
165-728C	Leo Gagosian, Bakersfield, Calif.							
165-729C	Guedera Farms, Bakersfield, Calif.		T					
165-730C	Guimarra Vineyards Corp., Bakersfield, Calif.	0.52						
166-761C	The William Mosesian Corp., Lamont, Calif.	0.78	0.02				0.13	
166-762C	Sabovich Bros., Bakersfield, Calif.	0.89						
166-763C	I.T.D. Packing Co., Reedley, Calif.							
	Tolerance, ppm	5.0	7.0	None	0.1	0.75	2.0	5.0
166-764C	Leo Gagosian, Bakersfield, Calif.	0.74	T					
166-765C	Guimarra Vineyards Corp., Bakersfield, Calif.	0.26						
166-766C	V. W. Heldcarn, Parlier, Calif.	0.11	0.03					
166-767C	Demesio C. Carranza, Thermal, Calif.							
168-027C	Muzinch Farms, Wheeler Ridge, Calif.	1.4	0.29					
168-028C	Elmo Vineyards, Inc., Visalia, Calif.						0.23	
095-798C	Bianco Fruit Corp., Fresno, Calif.	0.46	T	0.01				
095-796C	do	0.24		T				
095-797C	David Freedman & Co., Inc., Thermal, Calif.		T	T				
095-080C	Bianco Fruit Corp., Fresno, Calif.	0.35	T	T				
095-992C	Heggblade, Margulers Co., San Francisco, Calif.	1.33					0.29	
095-990C	James Macchiaroli Fruit Co., Higley, Ariz.							
095-799C	David Freedman & Co., Inc., Thermal, Calif.		T	T				
095-991C	The Willaim Mosesian Corp., Lamont, Calif.	0.20	T	T				
095-989C	James Macchiaroli Fruit Co., Higley, Ariz.		T	T				
095-122C	do		T	0.01				
095-123C	do		T	T				
095-121C	The William Mosesian Corp., Lamont, Calif.	0.61					0.08	
	Packer level							
211-644C	Russo Brothers, Arvin, Calif.	0.13						
211-645C	Logrecco & Sons, Bakersfield, Calif.	0.40	0.03	0.01				0.18
211-646C	Marko Zaninovich, Earlimart, Calif.							
211-647C	do	0.17						
211-648C	Pagliarulo Fruit Co., Delano, Calif.	0.02						
211-649C	do	0.01						0.01
211-650C	A. Caratan & Sons, Delano, Calif.						0.08	0.44
211-651C	do						0.28	1.7
211-652C	Agri-Business Investment Co., Ducor, Calif.							0.02
211-653C	do	0.15						
211-654C	United Packing Co., Parlier, Calif.							
211-655C	L. R. Hamilton, Reedley, Calif.	0.43	0.04	0.02		0.02		

[1] Safeway Store, 1730 Hamlin St. N.E., Washington, D.C.
[2] Giant Food Store, 4900 Annapolis Rd., Bladensburg, Md.

Note: T—Trace, indicates less than 0.01 p.p.m.

PESTICIDE RESIDUES IN GRAPES

	Fiscal year 1967	Fiscal year 1968	July 1, 1968, to Mar. 30, 1969	Total
Number of samples	208	61	65	334
Number with residues	138	35	22	195
DDT—Tolerance 7 p.p.m.:)[1]				
Percent incidence	31.3	31.1	12.3	27.5
Average p.p.m	0.05	0.08	0.01	0.05
Range p.p.m	T-3.18	T-3.19	T-0.21	
DDE—Tolerance (none):				
Percent incidence	37.0	32.8	15.4	32.0
Average p.p.m	T	T	T	T
Range p.p.m	T-0.37	T-0.05	T-0.08	
TDE—Tolerance 7 p.p.m.:				
Percent incidence	3.8	9.8	9.2	5.4
Average	T	T	T	T
Range p.p.m	T-0.05	T-0.07	T-0.01	
Dieldrin—Tolerance 0.1 p.p.m.:				
Percent incidence	2.4			1.5
Average p.p.m	T			T
Range p.p.m	T-0.48			
Carbaryl—Tolerance 10 p.p.m.:				
Percent incidence	2.4	1.6	2.1	2.4
Average p.p.m	T	0.01	T	T
Range p.p.m	0.01-0.05	0.80	T	
Keilthane—Tolerance 5 p.p.m.:				
Percent incidence	4.3	8.2	7.7	5.7
Average p.p.m	0.01	0.04	0.05	0.02
Range p.p.m	T-1.01	0.07-0.92	T-1 34	
Parathion—Tolerance 1 p.p.m.:				
Percent incidence	6.3	3.3	1.5	4.8
Average p.p.m	T	T	T	T
Range p.p.m	T-0.21	T-0.02	0.02	
Ethion—Tolerance 2 p.p.m.:				
Percent incidence	4.3	6.6	6.2	5.1
Average p.p.m	0.01	0.01	0.01	0.01
Range p.p.m	0.03-0.84	0.03-0.08	0.02-0.28	
Tedion—Tolerance 5 p.p.m.:				
Percent incidence	8.2	6.6	1.5	6.6
Average p.p.m	0.02	0.02	T	0.02
Range p.p.m	T-0.69	0.07-0.39	0.11	
Aldrin—Tolerance 0.1 p.p.m.:				
Percent incidence	3.4	4.9		3.0
Average p.p.m	T	T		T
Range p.p.m	T-0.01	0.01-0.03		
Chlorbenside—Tolerance (none):				
Percent incidence		1.6		0.3
Average p.p.m		T		T
Range p.p.m		0.10		
Endosulfan—Tolerance 2 p.p.m.:				
Percent incidence	1.0			0.6
Average p.p.m	T			T
Range p.p.m	T-0.09			
Methoxychlor—Tolerance 14 p.p.m.:				
Percent incidence	1.0			0.6
Average p.p.m	0.01			T
Range p.p.m	0.24-0.96			
Diazinon—Tolerance 0.75 p.p.m.:				
Percent incidence	0.5	1.6		0.6
Average p.p.m	T	T		T
Range p.p.m	0.11	0.01		

[1] P. p.m.—parte per million.

PESTICIDE RESIDUES IN CALIFORNIA GRAPES

	Fiscal year 1967	Fiscal year 1968	July 1, 1968, to Mar. 30, 1969	Total
Number of samples	94	50	58	202
Number with residues	49	27	18	94
DDT—Tolerance 7 p.p.m.:[1]				
Percent incidence	17.0	26.0	8.6	16.8
Average p.p.m	0.01	0.07	T	0.02
Range p.p.m	T–0.15	T–3.19	T–0.11	
DDE—Tolerance (none):				
Percent incidence	T	T	T	T
Average p.p.m	11.7	32.0	13.8	17.
Range p.p.m	T–0.09	T–0.08	T–0.05	
TDE—Tolerance 7 p.p.m.:				
Percent incidence	3.2	10.0	6.9	5.9
Average p.p.m	T	T	T	T
Range p.p.m	T–0.05	T–0.07	T–0.01	
Dieldrin—Tolerance 0.1 p.p.m.:				
Percent incidence	1.0			0.5
Average p.p.m	T			T
Range p.p.m	T			
Carbaryl—Tolerance 10 p.p.m.:				
Percent incidence		2.0	3.4	1.5
Average p.p.m		0.02	T	T
Range p.p.m		0.80	T	
Kelthane—Tolerance 5 p.p.m.:				
Percent incidence	8.5	10.0	8.6	8.9
Average p.p.m	0.03	0.05	0.05	0.04
Range p.p.m	T–1.01	0.07–0.92	T–1.34	
Parathion—Tolerance 1 p.p.m.:				
Percent incidence	1.0			0.5
Average p.p.m	T			T
Range p.p.m	T			
Ethion—Tolerance 2 p.p.m.:				
Percent incidence	9.6	8.0	6.9	8.4
Average p.p.m	0.02	0.01	0.01	0.01
Range p.p.m	0.03–0.48	0.03–0.18	0.02–0.28	
Tedion—Tolerance 5 p.p.m.:				
Percent incidence	17.0	8.0	1.7	10.4
Average p.p.m	0.04	0.02	T	0.02
Range p.p.m	T–0.69	0.07–0.39	0.11	
Aldrin—Tolerance 0.1 p.p.m.:				
Percent incidence	6.4	6.0		4.5
Average p.p.m	T	T		T
Range p.p.m	T–0.01	0.01–0.03		
Chlorbenside—Tolerance (none):				
Percent incidence		2.0		0.5
Average p.p.m		T		T
Range p.p.m		0.10		
Endosulfan—Tolerance 2 p.p.m.:				
Percent incidence	2.1			1.0
Average p.p.m	T			T
Range p.p.m	T–0.09			
Methoxychlor—Tolerance 14 p.p.m.:				
Percent incidence	2.1			1.0
Average p.p.m	0.01			0.01
Range p.p.	0.24–0.96			
Diazinon—Tolerance 0.75 p.p.m.:				
Percent incidence	1.0			0.T
Average p.p.m	T			5
Range p.p.m	0.11			

[1] P.p.m.—parts per million.

SURVEY OF PESTICIDE RESIDUES ON TABLE GRAPES GROWN IN SOUTHERN CALIFORNIA AND ARIZONA

Background

The FY 1970 FDA Pesticide Residue Surveillance Program calls for sampling and examination of raw agricultural products on an individual commodity basis. This involves a series of samples of a given food product representative of a geographic area, a growing area, or any other meaningful subdivision. Each District determines what foods shall be so covered based on their knowledge of the local situation.

Los Angeles District undertook a survey of table grapes grown in the District area. This survey was to serve as an information base concerning the local grape industry and to investigate recent highly publicized allegations regarding misuse of pesticides by grape growers.

The Los Angeles District area includes Southern California, the southern tip of Nevada, and the State of Arizona. We have three principal grape growing regions within our boundaries. Two are in Southern California and one in Arizona. These are:

1. *Coachella Valley* (Calif.) This includes the towns of Coachella, Mecca, Thermal and Indio. The growing season runs from May through July and nearly all fields are in table grapes. USDA figures indicate an annual production of about 9,500 tons.

Investigation indicated growers generally use DDT and Carbaryl (Sevin) for insect control. Parathion was reported used by one grower to control a thrip (small sucking insect) problem. No Aldrin or Simazine have been used in the Coachella area.

We collected and examined a total of 15 samples of table grapes representing 14 principal growers in the Coachella Valley. (One grower produced two varieties—both were sampled.)

2. *San Bernardino Area* (Calif.) This includes San Bernardino, Mira Loma and Cucamonga. There is light production of grapes during June and August, but the main growing season is in September and October. The grapes grown are principally used in wine manufacture as opposed to table consumption.

No samples were taken at this time.

3. *Phoenix Area* (Ariz.). This generally encompasses the Phoenix, Higley and Litchfield regions. The growing season is mid-June through July with an annual production of table grapes only slightly less than the Coachella Valley area. The Phoenix area produces about 75 percent of the total grapes grown in Arizona.

The most common pesticide used is Carbaryl. There is presently a statewide moratorium on the use of DDT on any agricultural product. The largest firm commercially applying pesticides to grapes in this area stated than no Aldrin has been used in the past five years and that Simazine has not been used for the past year.

A total of 12 samples were collected and examined representing eight principal growers (as above, different samples from the same grower represented different grape varieties).

Analytical findings

Each sample consisted of 22 lbs. of grapes. The entire sample was composited and chopped, and a representative portion taken for analysis.

The analytical system used would detect chlorinated pesticides (i.e. DDT, Aldrin, etc.) at levels as low as 0.003 ppm. We only quantitate, however, those residues which equal or exceed 0.01 ppm. Any residue which is less than 0.01 ppm but is identifiable is reported as a "trace." Organophosphate pesticides (i.e., Parathion, etc.) are also detected and may be quantitated at the 0.01 ppm level. All samples were also examined for Carbaryl residues by a separate method sensitive to the 0.1 ppm level.

TABLE GRAPE SURVEY

Coachella Valley samples (collected July 7, 1969)

Sample number	Growing area	Grape variety	Findings (p.p.m.)		
			DDT	DDE	Carbaryl
167-720C	Rancho Mirage	Thompson	Trace	0.03	0
167-721C	Mecca	do	do	0.02	0
167-722C	Thermal	do	do	Trace	0
167-723C	Indio	do	do	do	0
167-724C	Coachella	do	do	do	0
167-725C	do	do	do	do	0
167-726C	Thermal	do	0.06	do	0
167-727C	do	do	Trace	do	0.2
167-728C	do	do	do	do	0
167-729C	Coachella	do	do	do	0
167-730C	do	do	0.06	0.01	0
167-731C	Thermal	Black Beauty	0.03	0.03	0
167-732C	Mecca	Cardinal	0.02	0.02	0
167-733C	do	Thompson	0.02	0.01	0
167-734C	Thermal	do	Trace	Trace	0

Note: No organophosphate pesticides were detected. The DDE found is a degradation product of DDT. No other chlorinated pesticides were detected. DDT and analogs have a combined tolerance of 7 p.p.m. Carbaryl tolerance is 10 p.p.m.

TABLE GRAPE SURVEY

Phoenix area samples (collected July 7–8, 1969)

Sample number	Growing area	Grape variety	Findings	
			DDE (p.p.m.)	Carbaryl (p.p.m.)
166–373C	Higley	Exotic	0	0
166–374C	do	Cardinal	0	0
166–375C	do	Thompson	0	0
166–376C	do	do	0	0
166–377C	Eloy	Cardinal	0	0
166–378C	Queen Creek	do	0	0
166–379C	Higley	Thompson	0	0
166–380C	Litchfield	Cardinal	Trace	0
166–381C	do	Thompson	Trace	0
166–382C	do	do	0	0
166–383C	do	Exotic	Trace	0.4
166–384C	Phoenix	Thompson	Trace	0.1

Note: No organophosphate pesticides were detected. No other chlorinated pesticides were detected. The trace amounts of DDE found in the Litchfield and Phoenix samples are believed due to contamination by windblown dry earth. Arizona soil is heavily contaminated with DDT and its metabolites. (See Pesticide Monitoring Journal, vol. 2, No. 3, p. 129, Dec. 1968, "Pesticides in Soil—An Ecological Study of DDT Residues in Arizona Soil and Alfalfa.")

Mr. MURPHY. Mr. President, the grapes presented to the England Laboratory were taken there by Manuel Vasquez, the Washington district representative of the United Farm Workers Organizing Committee. They were purchased, Mr. Cohen said in his testimony, from Safeway Stores in Washington.

Mr. Cohen said the grapes were produced by "Bianco." That would be Anthony A. Bianco, Jr., and Bianco Fruit Corp. of Delano, Arvin, and Thermal. Mr. Bianco has not used aldrin in any form on his properties in the past 6 years. He has filed statements to this effect from his professional pesticide applicator and supplier and from himself.

I ask unanimous consent that the statements of Mr. Bianco and of Mr. Sampson, his pest control applicator, be printed in the RECORD, together with a report of test conducted on grapes from the Bianco Ranch by the BC Laboratories of Bakersfield, Calif.

There being no objection, the statements were ordered to be printed in the RECORD, as follows:

STATEMENT OF ANTHONY A. BIANCO, JR.

This will certify that I, Anthony A. Bianco, Jr., owner and operator of the Bianco Fruit Corporation, have not purchased, obtained or received the chlorinated hydrocarbide Aldrin and have not applied, administered or used Aldrin in any of my fields during the past six years. Aldrin has not been authorized for use on my property in any form or method during that period. The Griffin Spray Company has applied all pesticides for the Bianco Fruit Corporation during the past six years and has made no application or other use of the chemical Aldrin on my property in that period.

ANTHONY A. BIANCO, JR.,
Bianco Fruit Corp., Delano-Arvin-Thermal.

STATE OF CALIFORNIA,
County of Kearn, ss:

On August 8, 1969, before me, the undersigned, a Notary Public in and for said County and State, personally appeared Anthony A. Bianco Jr. known to me to be the President of the Corporation that executed the within instrument, known to me to be the person who executed the within instrument on behalf of the Corporation therein named, and acknowledge to me that such Corporation executed the within instrument pursuant to its bylaws or a resolution of its Board of Directors.

Witness my hand and official seal.

JOYCE M. MCPHERSON.

My commission expires Mar. 10, 1970.

To whom it may concern:

This is to certify that Bianco Fruit Corporation has not purchased or applied, to our knowledge, any Aldrin during the past six years. Tom Griffin is an owner of Southern Valley Chemical and is the owner of Griffin Spray Company. Griffin Spray Company has handled the application of pesticides for Bianco Fruit Corporation for the past six years and has made no application of the chemical Aldrin.

(signed) ED SAMPSON,
Manager & Owner, Southern Valley Chemical Co.

Insecticide residue determination

(Concentration in parts per million as received basis)

Constituent:	
Aldrin	0. 008
Lindane (less than)	. 001
Dieldrin (less than)	. 004
Endrin (less than)	. 001
Parathion (less than)	. 01
Sulfur (less than)	. 017
Kelthane (less than)	. 01
Toxaphene (less than)	. 1
DDE	. 004
DDD	. 003
DDT	. 008

Residue determination by Gas Chromatography with electron capture detection.

B. C. LABORATORIES.
J. J. EGLIN.

Mr. MURPHY. Mr. President, Seldon Morley, the Agricultural Commissioner of Kern County, Calif., in which Mr. Bianco does the bulk of his grape production has submitted a statement that there has been no commercial application of Aldrin in any grapes in Kern County. I ask unanimous consent that Mr. Morley's statement be printed at this point in the RECORD.

There being no objection, the statement was ordered to be printed in the RECORD, as follows:

STATEMENT OF SELDON MORLEY, AGRICULTURAL COMMISSIONER, COUNTY OF KERN, CALIF., AUGUST 7, 1969

Through May 30, 1969, there has been no commercial application of the pesticide aldrin on any table grape vineyards in the County of Kern this year.

The only commercial application of aldrin in the County of Kern in 1969 has been as follows:

January 1969, 104 acres of lettuce.
February 1969, 81 acres of sugar beets.
March 1969, 127 acres of tomatoes.
April 1969, 46 acres of tomatoes.

There have been no further commercial applications of aldrin in the County of Kern this year.

Aldrin must be registered with the State Department of Agriculture and all commercial applications of aldrin and other pesticides to agricultural crops are required by law to be reported to the Agricultural Commissioner in the county where applied.

Mr. MURPHY. Mr. President, the last grapes shipped by Mr. Bianco from the Coachella Valley were cleared by the Federal FDA Inspector C. R. Lewis—No. 319—and went to Texas on July 13. No Coachella Valley grapes could have retained salable quality until late July when the grapes in question had to be purchased.

Pesticide chemists have found that aldrin converts very rapidly to the chemical dieldrin appearing within 6 or 7 hours after aldrin application in the fields. Dr. Paul E. Porter, the assistant to the director of physical sciences for

the Shell Development Co., biological research center in Modesto, Calif.—a division of the only firm manufacturing aldrin—reports it would take an application of 10 to 15 pounds of aldrin per acre to achieve a level of 18 parts per million immediately after spraying. The normal application, as approved by the California Department of Agriculture, is one-fourth pound per acre.

But this is moot. Aldrin is not used on grapes in Kern County—as Mr. Morley specifies—and normal application of the pesticide in California is confined to soil as a grasshopper combatant. Although no aldrin was used, grapes showed up 3,000 miles away in Washington containing a massive dose of aldrin.

Dr. Porter reports aldrin converts rapidly to dieldrin while exposed to sunlight—with only negligible amounts of aldrin remaining after 6 days. To achieve 18 parts per million, aldrin would have to be sprayed directly on the grapes just before shipment. And as the agricultural commissioner of Kern County has stated, aldrin is not used on grapes in that county.

The conclusion is clear: The grapes presented to the England Laboratory had somehow achieved strange qualities which I find very difficult to explain. And it seems possible that a subcommittee of the U.S. Senate has been the victim of duplicity.

If this be the case—this tactic on the part of the United Farm Workers Organizing Committee is a vicious type of deceit and makes clear the witness has raised the pesticide question as part of UFWOC's "rule or ruin" methods.

"Rule or ruin" is not my phrase. It is the statement of a dozen table grape growers who tried to negotiate a contract with UFWOC. The negotations failed because the United Farm Workers Organizing Committee refused—in the statement's words—to bargain in good faith.

These growers exposed "the pesticide issue" in its true light by citing a statement written last July 3 by the United Farm Worker's Organizing Committee and addressed to the Federal Mediation and Conciliation Service. Here is the pertinent part of that statement:

That we are prepared to give a moratorium to the whole industry on the pesticide campaign for a limited time in exchange for an acceptable contract covering all workers, all crops.

This might be considered a new type of biological blackmail.

Mr. President, I believe the true purpose of UFWOC in raising the pesticide issue was well set forth in a conversation which Jerome Cohen had with Mrs. Eleanor Schulte, office manager for the South Central Farmers Committee in Delano, Calif., on June 10, 1969. I ask unanimous consent that a memorandum from Mrs. Schulte concerning this conversation be printed at this point in the RECORD:

There being no objective, the memorandum was ordered to be printed in the RECORD, as follows:

MEMORANDUM RE CONVERSATION WITH JEROME COHEN

To whom it may concern:

On Tuesday, June 10, 1969 at approximately 3:30 p.m., Mr. Cohen came to the South Central Farmers Committee office, asked for me by name, and said he would like to talk to me. He said the purpose of his visit was to have me pass along to our growers the substance of our conversation. I will attempt to enumerate below, to the best of my recollection, the points he made in our conversation. In most cases I cannot quote him verbatim, but will list the point of his remarks.

He introduced himself as Jerry Cohen, Attorney for UFWOC.

The Board of UFWOC (he mentioned the names Larry, Dolores and Phil, whom I assume to be Larry Itliong, Dolores Huerta and Phil Veracruz) had met the previous night and voted to mount an all-out campaign this year on the boycott, including the pesticide issue.

He spoke of the "cranberry scare," and said that every time the Department of Agriculture issued a bulletin denying pesticide poisoning in cranberries, it only made the situation worse. He said we couldn't fight the pesticide issue, and even "Baxter and Whitaker" would not be able to wage an effective campaign against it.

He claims that traces of DDT have been found in grapes, and that DDT has been found to cause cancer in mammals. He mentioned that the "American

eagle, the symbol of America" is being killed off by DDT. He said suits have been filed on DDT, and more will be filed. I asked him if negotiating with the union would render pesticides harmless, and he said that the health and welfare clauses in the contracts could provide safety controls that will protect both the worker and the consumer.

He hinted that UFWOC could scare the wits out of the American public with the threat of pesticide poisoning, and we couldn't do anything about it.

The boycott did not hurt the growers much last year because it did not get organized until November, but this year it is all set to go in 275 cities. He corrected himself to say 277 cities "as of today."

For those growers who would negotiate with the union, the boycott machinery will be used to promote the sale of their grapes. I said that I could not recall that the union had promoted the sale or DiGiorgio grapes after signing with the union. He said that was because DiGiorgio, on the contrary, after signing with the union had "switched labels with Bruno, Kenny Kovacevich" and one other name I cannot recall. He said that when the growers came to realize it was in their own best interest not to switch labels, the boycott machinery could be used very well to promote the sale of union picked grapes.

When the pesticide issue came up with Seldon Morley, the Kern County Agricultural Commissioner, UFWOC tried for nine months to settle things quietly, but Mr. Morley and his people would not cooperate and thereby forced the union against its wishes, to bring the case into court and into the public eye.

He said the union had had conversations in the past with John Giumarra, Jr., and that "we told him we would make the boycott a national issue, and he laughed, when we told him we would bring up the pesticide issue, and he laughed, but we did all these things." He said he hoped I would be more effective in passing along to the growers his message. He said something about establishing a line of communications, and that I could turn my office into a negotiating center. I got the feeling here that he was trying to see if he could detect whether or not he could give me delusions of grandeur about being the key figure in ending the whole mess. He said the growers do not need to be so fearful of negotiating. His exact words were "the growers seem to feel that if they sit down to a negotiating table with the union they will lose their virginity."

I asked him again his purpose in visiting me and he said it was to have me pass along to the growers the message that if we do not negotiate, the union will press the boycott and the pesticide campaign, which will be needlessly destructive for both sides.

ELEANOR SCHULTE,
Office Manager, South Central Farmers Committee.

Mr. MURPHY. Mr. President, obviously the union has raised the pesticide issue in an effort to further harass the grape industry and in furtherance of their design to force the grape growers to force their workers to join a union which they do not wish to join. I believe they have gone too far in this case and that this deplorable story will show the UFWOC effort up for what is really is.

One of the contributing factors in this entire unfortunate affair has been the contrived confusion, built on propaganda, half truths, and, in some cases, outright falsehood. I intend from now on to check all witnesses for creditibility, character, and purpose, so that the subcommittee may make proper and productive pronouncements as a result of these hearings.

U.S. SENATE,
COMMITTEE ON LABOR & PUBLIC WELFARE,
Washington, D.C., September 9, 1969.

Mr. BASIL WINSTEAD,
Vice-President, Safeway Stores, Inc.,
Landover, Md.

DEAR MR. WINSTEAD: This will confirm the telephone conversation which I understand Mr. Boren Chertkov, Counsel to the Migratory Labor Subcommittee, had with you earlier today regarding Senator Murphy's request that this Subcommittee reopen its hearings on the Effects of Pesticides on Farmworkers,

and recall witnesses that testified on August 1 about pesticide residues on table grapes.

As I know Mr. Chertkov discussed with you, the Subcommittee's primary interest in this matter is to learn the entire truth about the issues which developed out of these hearings. In particular, we hope to obtain all relevant facts concerning the charge that laboratory tests submitted to the Subcommittee which showed table grapes with aldrin residues 180 times the human tolerance level were misleading.

We would like to learn more about reports that your company had independent laboratory tests conducted of the grapes in question, the results of such tests if they were conducted, and any subsequent actions of the company concerning this situation. Please send us explanations and copies of any test results you have obrained in this regard.

I am pleased to learn of the cooperation that you offered Mr. Chertkov, and we will soon be in touch with you regarding any additional matters that we believe are worthy of careful review.

With warm regards.

Sincerely,

(signed) WALTER F. MONDALE,
Chairman, Subcommittee on Migratory Labor.

U.S. SENATE,
COMMITTEE ON LABOR AND PUBLIC WELFARE.
Washington, D.C., September 9, 1969.

Dr. CHARLES C. JOHNSON, Jr.,
Administrator, Consumer Protection and Environmental Health Service, Department of Health, Education, and Welfare, Washington, D.C.

DEAR DR. JOHNSON: This will confirm the telephone conversation which I understand Mr. Boren Chertkov, Counsel to the Migratory Labor Subcommittee, had with Mr. J. K. Kirk, Associate Commissioner of FDA for Compliance, earlier today regarding Senator Murphy's request that this Subcommittee reopen its hearings on the Effects of Pesticides on Farmworkers, and recall witnesses that testified on August 1 about pesticide residues on table grapes.

As I know Mr. Chertkov discussed with you, the Subcommittee's primary interest in this matter is to learn the entire truth about the issues which developed out of these hearings. In particular, we hope to obtain all relevant facts concerning the charge that laboratory tests submitted to the Subcommittee which showed table grapes with aldrin residues 180 times the human tolerance level were misleading.

Please send me immediately any information that you have regarding other laboratory tests recently conducted on grapes, including explanations and copies of any tests results. Please also advise me of the date that you received this information.

Thank you for your attention to this request.

With warm regards.

Sincerely,

(Signed) WALTER F. MONDALE,
Chairman, Subcommittee on Migratory Labor.

SAFEWAY STORES, INC.,
Landover, Md., September 17, 1969.

Senator WALTER F. MONDALE,
Chairman, Subcommittee on Migratory Labor,
Washington, D.C.

DEAR SENATOR MONDALE: Thank you for your letter of September 9th requesting information concerning our Company's tests as related to pesticide residues on table grapes.

For your information, we are attaching reports and other data dealing with the laboratory tests which we undertook on August 1, 1969 concerning the above product. We have also outlined the actions taken in chronological order to further clarify our situation.

Two of our Company representatives met with Mr. Boren Chertkov on Friday, September 12th, in the offices of the National Association of Food Chains, and relayed the attached information to him.

Again, thank you for your letter and we hope that the enclosed data will be of assistance to you.

Best regards.

Sincerely,

BASIL WINSTEAD,
Vice President and Division Manager.

August 1st—Grapes identified as purchased at Safeway introduced into hearings. Safeway Stores, Incorporated, Washington, D.C. Division, notified two laboratories to sample test the grapes that had been received by Safeway. (C.W. England Laboratories, Eastawai Research Laboratories).

August 2nd—Product samples of grapes were selected by the above two laboratories.

August 6th—C. W. England reported preliminary results via telephone. Results indicated chemicals present which California Department of Agriculture reported had not been used. Laboratory requested to re-check results and tests.

August 7th—Strasburger and Siegel, Incorporated contacted and requested to sample test the product.

August 8th—Division Office received telegram with information from California Department of Agriculture saying that presence of non-toxic sulphur could be confused with other elements. All three laboratories contacted by phone with the above information relayed to them along with request to re-check results. Company notified supplier to temporarily suspend shipments of product until test results clarified.

August 9th—Phone report from Eastawai on tentative test results.

August 12th—Food and Drug Administration report published.

August 14th—Written report from C. W. England (attached dated August 8th). Phone report from Strasburger and Siegle (attached written report dated August 15th).

August 15th—Eastawai phone report. (Attached written report dated August 15th).

August 19th—Company notified supplier to resume shipments.

August 20th—Written notification to all laboratories requesting clarification of test results as related to article which appeared in *Journal of Agricultural and Food Chemistry*, Volume 15 entitled, "Identification of the Aldrin Artifact" by J. R. Pearson, F. D. Aldrick and A. W. Stone. (Letters and article attached).

September 10th—Response to the August 20th letter by Strasburger and Siegel. (Attached). No response to-date from C. W. England Laboratories or Eastawai Research Laboratories.

THE C. W. ENGLAND LABORATORIES, INC.
Washington D.C., August 1, 1969.

CERTIFICATE OF ANALYSIS (A. O. A. C. AND A. P. H. A. METHODS)

Product: Thompson Seedless Grapes.

Received from: United Farm Workers Organizing Committee AFL/CIO, 945 G Street, NW, Room 207, Washington, D.C. 20001.

Date Received: July 30, 1969

REPORT

Chlorinated hydrocarbons

Thompson Seedless Grapes (Richard Bagarian—Mecca, California), 0.11 ppm Simazine; 1.04 ppm Aldrin.

Thompson Seedless Grapes (Bianco Fruit Corporation—Chellchella Valley, Theral & Mecca, California), 0.27 ppm Simazine; 1.31 ppm BHC; 18 ppm Aldrin.

NOTE. ppm—Parts per million. All results are in terms of Product. All results are accomplished by use of gas chromatography.

HAROLD M. WINDLAND
Director.

STRASBURGER & SIEGEL, INC.,
Baltimore, Md., August 15, 1969.

CERTIFICATE OF ANALYSIS (A. O. A. C. AND A. P. H. A. METHODS)

Laboratory No.: 12388.
Sample of: Grapes (See Below).
Received from: Safeway Stores, Inc., Landover, Md.
Marked: Sampled by M.S. 8/7/69 (See Below).

REPORT

2 lb. Composite Sample taken from 10 boxes, representing a shipment of 3000 boxes (26 lbs. each)

Sample of: Thompson Seedless Grapes—26 lb. net wt., Anthony Brand, California Fruits Growers & Shippers, Bianco Fruit Corp., Main Office, Fresno, Calif.

Chlorinated Pesticide Residues by Electron Capture Gas Chromatography: Kelthane—0.20 ppm; DDT—0.11 ppm; Other Chlorinated Pesticide Residues—None.

Organosphospahte Pesticide Residues by Thermionic Detector Gas Chromatography—None.

EASTAWAI RESEARCH LABORATORIES, INC.,
Baltimore, Md., August 15, 1969.

CERTIFICATE OF ANALYSIS

Laboratory No.: SF02086901
Sample of: Red, Green & Black grapes.
Received from: Safeway Stores, Inc. 6700 Columbia Park Road, Landover, Maryland 20785, Warehouse at Cabin Branch Road. Mr. Len Corsentino, Public Relations Manager.
Date of Receipt: 02July 69

REPORT

A. Object—To determine the pesticide content in each of the three grape samples provided.

B. General Summary.—TLC—All (3) three grape samples were positive for chlorinated pesticide residues. GC—Positive for Aldrin and Dieldrin. Total Pesticide residue in Red grapes=16.8 ppm. Total Pesticide residue in Green grapes = 17.6 ppm. Total Pesticide residue in Black grapes = 19.1 ppm. These results are in gross violation of accepted standards.

C. Procedure—Thin Layer Chromotography.—a. 26 gms of each of the grape varieties were placed into a flask of suitable size.

b. To each flask was added 1000 ml of Hexane saturated with N.N.-dimethyl formamide.

c. Each of the flasks were stoppered with saran covered rubber stoppers and shaken on a mechanical shaker for 5 hours.

d. The super-natant liquid was then drawn off, measured, and evaporated under vacuum to dryness.

e. The residue was then re-dissolved in 1.0cc hexane and chromatographed.

D. Standard Information.—Maximum allowable hygienic standards as established by the American Conference of Governmental Industrial Hygienists for specified agricultural commodities are 0, 0.1, 0.25 and 0.57 ppm by weight for Dieldrin and 0, 0.1, 0.25 and 0.75 ppm by weight for Aldrin.

E. References.—a. Industrial Hygienic and Toxicology, Second Revised Edition, Vol. 2, pgs 1356 thru 1359.

b. Official Methods of Analysis of the Association of Official Agricultural Chemists, Tenth Edition, with official revisions.

c. Gas Chromatographic Analysis of Drugs & Pesticides by Benjamin Grendcinowicz, pgs. 408–512

Respectfully submitted.

EARL S. WAITSMAN,
Director of Laboratories.

THE C. W. ENGLAND LABORATORIES
Washington, D.C., August 8, 1969.

CERTIFICATE OF ANALYSIS (A. O. A. C. AND A. P. H. A. METHODS)

Product: Grapes.
Received from: Safeway Stores, Inc.—Produce Merchandising Department, 1501 Cabin Branch Rd. Landover, Maryland 20785—Attention: Mr. Allen Francis.
Date Received: August 4, 1969.

REPORT

Chlorinated hydrocarbons
Thompson Seedless Grapes (Anthony Bianco brand), 0.65 ppm Aldrin; 0.03 ppm Simazine.
Black Grapes (Anthony Bianco brand), 0.05 ppm Aldrin.
Red Grapes (Anthony Biance brand), 0.08 ppm Aldrin.
Castys Red Grapes, 0.03 ppm Aldrin.
NOTE: ppm—Parts per million. All results are in terms of Product. All results are accomplished by use of gas chromatography. The extract from the Thompson Seedless Grapes was processed using a second method (paper chromatography). This method also shows the presence of Aldrin.
Product: Grapes.
Received from: Safeway Stores, I c.—Produce Merchandising Dept., 1501 Cabin Branch Road, Landover, Maryland 20786—Attn: Mr. Allen Francis.
Date Received: August 6, 1969.

REPORT

Chlorinated hydrocarbons
Thompson Seedless Grapes (from Rail cars), 0.32 ppm Aldrin; 0.04 ppm Simazine.
NOTE: ppm—Parts per million. All results are in terms of Product. All results are accomplished by use of gas chromatography.

HAROLD M. WINDLAN,
Director.

Senator MONDALE. I understand Senator Murphy also has an opening statement before we begin testimony.

Senator MURPHY. Yes, I wish to welcome the witnesses. I would like to say that I am very pleased that these hearings of the Subcommittee on Migratory Labor have been reconvened.

It is extremely important that we resolve some serious questions which have arisen as a result of testimony and evidence submitted to this subcommittee on August 1.

We are dealing with an issue of critical importance to the American people, whether they be employees, employers, or consumers. It is therefore vital that the Senate of the United States have before it all facts bearing on the questions raised before this committee.

I hope that this hearing will bring out all pertinent facts pertaining to the charges made before this committee on August 1 that California table grapes are contaminated by dangerous levels of pesticide residue. I am here to learn those facts from the concerned witnesses who will appear.

On August 1, Mr. Jerome Cohen, General Counsel of the United Farm Workers Organizing Committee, appeared before this committee and testified that two bunches of Thompson seedless grapes contained quantities of the pesticide aldrin 180 times the established tolerance level for human beings.

A report from the C. W. England Laboratories, Inc., of Washington, D.C., was submitted to the committee saying that the grapes had an aldrin content of 18 parts per million compared with the legal tolerance level of .10 parts per million.

The laboratory report indicated that the grapes in question had been received from the United Farm Workers Organizing Committee, and representatives of the laboratory later told the news media that the grapes had been furnished them by a UFWOC representative.

Chairman Mondale, indicating that the grapes in question were being sold by Safeway Stores in Washington, D.C., requested the Food and Drug Administration to test grapes in markets around the country.

The FDA did conduct such tests on 60 samples of grapes, 12 of these from packer lots in the San Francisco market area and 48 samples having been obtained from retail stores in New York, Chicago, Los Angeles, and Baltimore-Washington (including the same Washington chain store from which the grapes on which Mr. Cohen reported had been obtained).

The results of the FDA survey showed that there was no aldrin residue on any of the grapes tested. The FDA also stated that the survey showed there was no chemical residue of any nature on any grape sample that even approached the level of human tolerance.

Subsequently, the grower of the grapes in question—Mr. Anthony A. Bianco, Jr., who will be a witness tomorrow—has testified that he has not used aldrin in any form on any of his properties. Other competent authorities point out that aldrin isn't applied to grapes for any reason.

As I stated on the Senate floor on August 12, I find it difficult then to understand how the grapes presented to the England Laboratory achieved the unusual qualities ascribed to them, and I have questioned whether or not this committee has been subjected to duplicity in an effort to frighten the American consumer and discredit the California table-grape industry.

It is vital to this committee—and to the public—that these questions be resolved. I hope that we can obtain at these hearings concrete evidence relevant to this issue, and I urge that all of us give careful attention to the testimony because to a large extent these witnesses will be speaking through us to the American consumer.

It is my sincere desire that we get at the basic facts of this problem which I wasn't present at the hearing. Reading the record, obviously I found a great discrepancy. For that reason, Mr. Chairman, I asked that the committee be reconvened so that we could find out once and for all excatly where the fault lies, what exactly did happen, where the grapes came from, where the aldrin came from, and if we are in fact endangering the lives of the consumers and the workers.

Senator MONDALE. Thank you, Senator Murphy. We will place your remarks, in full, in the record.

(The statement of Senator Murphy follows:)

STATEMENT OF HON. GEORGE MURPHY, A U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator MURPHY. I am very much pleasured that these hearings of the Subcommittee on Migratory Labor have been reconvened. It is extremely important that we resolve some serious questions which have

arisen as a result of testimony and evidence submitted to this subcommittee on August 1.

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On August 1, Mr. Jerome Cohen, general counsel fo the United Farm Workers Organizing Committee, appeared before this committee and testified that two bunches of Thompson seedless grapes contained quantities of the pesticide aldrin 180 times the established tolerance level for human beings. A report from the C. W. England Laboratories, Inc., of Washington, D.C., was submitted to the committee saying that the grapes had an aldrin content of 18 parts per million compared with the legal tolerance level of 0.10 parts per million.

The laboratory report indicated that the grapes in question had been received from the United Farm Workers Organizing Committee, and representatives of the laboratory later told the news media that the grapes had been furnished them by a UFWOC representative.

Chairman Mondale, indicating that the grapes in question were being sold by Safeway Stores in Washington, D.C., requested the Food and Drug Administration to test grapes in markets around the country. The FDA did conduct such tests on 60 samples of grapes, 12 of these from packer lots in the San Francisco market area and 48 samples having been obtained from retail stores in New York, Chicago, Los Angeles, and Baltimore-Washington (including the same Washington chain store from which the grapes on which Mr. Cohen reported had been obtained).

The results of the FDA survey showed that there was no aldrin residue on any of the grapes tested. The FDA also stated that the survey showed there was no chemical residue of any nature on any grape sample that even approached the level of human tolerance.

Subsequently the grower of the grapes in question—Mr. Anthony A. Bianco, Jr., who is here today as a witness—has testified that he has not used aldrin in any form on any of his properties. Other competent authorities point out that aldrin isn't applied to grapes for any reason.

As I stated on the Senate floor on August 12, I find it difficult then to understand how the grapes presented to the England laboratory achieved the unusual qualities ascribed to them, and I have questioned whether or not this committee has been subjected to duplicity in an effort to frighten the American consumer and discredit the California table grape industry.

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careful attention to the testimony because to a large extent these witnesses will be speaking through us to the American consumer.

Senator MONDALE. Do you have a further statement, Senator Cranston?

Senator CRANSTON. No, Mr. Chairman.

Senator MONDALE. Mr. Chavez, you may begin. I understand you want to introduce your fellow panelists. You may proceed in any order you wish.

STATEMENTS OF CESAR CHAVEZ, DIRECTOR OF THE UNITED FARM WORKERS ORGANIZING COMMITTEE; JEROME COHEN, COUNSEL TO UFWOC; AND MANUEL VASQUEZ, WASHINGTON REPRESENTATIVE OF UFWOC

Mr. CHAVEZ. Thank you, Mr. Chairman.

Thank you, Senator Cranston for the introduction.

I want to thank you, Senator Murphy, for asking that the committee be reconvened so that we can present further testimony on the issue of pesticides.

I have here today with me Mr. Jerry Cohen who is the general counsel of the United Farm Workers Organizing Committee and Mr. Manuel Vasquez who is the Washington representative of UFWOC, now leading the boycott campaign in Washington, D.C.. He will be testifying in a few moments regarding the aldrin episode in the Safeway stores but I think that more important than that is the whole question of health and safety for farmworkers and the unchecked application of dangerous pesticides that is casuing poisoning among large numbers of workers.

We are happy to be here and to deal first with the aldrin episode. We are also willing, if need be, to be put under oath while we testify so that everyone will be satisfied that what we are saying are the facts as we know them.

Manuel Vasquez is going to tell the committee his part in the aldrin-grape episode with Safeway.

Senator MONDALE. Mr. Vasquez, if you want, you may read your statement.

Mr. VASQUEZ. I will make a short, brief statement.

On the morning of July 30, me and Gene Boutillier were discussing in his office the possibility of residue on grapes here in the Washington area. He suggested to me the C. W. Laboratories, which is C. W. England Laboratories in the Northeast.

Immediately a friend of mine, John Walsh, and I went on a motorcycle in the Northeast to find the location of these laboratories.

When we found it from there we proceeded to the first Safewway store that we came across in that particular area. We traveled on Rhode Island Aveneue when we came across the first Safeway.

I immediately went into the store. I saw the grapes there. In that particular store the grapes were in pretty poor condition, they were really run down. You could not get a true test from these grapes.

On the second Safeway that we traveled to on Rhode Island, which is on 18th Street, Northeast, the grapes were wrapped in paper. I proceeded to the back of the store and I asked the produce

manager whether these grapes were from California or not. He told me that they were.

I said would you mind if I take down the name of the grower and the place where the grapes are from. He said, "No, as a matter of fact, why don't you just get one of those labels which are on the boxes," which at that time there were about six or seven boxes in the cooler rooms of that particular storage. Later I tore off the Bianco label.

Senator MONDALE. Let the record show that the witness is holding up for the benefit of those in the hearing room to see, a blue label.

Mr. VASQUEZ. Yes. We got the grapes there. I bought about 2 pounds. I paid for them and they were put in a paper bag and we proceeded to another store on Annapolis Road. We bought another 2 pounds or close to 2 pounds of grapes.

Now between these two bags of grapes they were very distinct because one of them was the neat type, not in paper or nothing, they were in neat bags, at Giant, and the ones who were wrapped in paper were the Safeway. They were marked distinctively.

When we took them down to the laboratory I told the person there that these were Bianco and these were from the other growers and they were marked right there and then.

He told me that the test was going to be completed at 9 o'clock on Friday, August 1. That morning I went there at 9 o'clock to pick them up and I brought them up here and this is as much as I can testify to.

Senator MONDALE. As I understand it, in brief, you went to these two stores, purchased grapes, determined at least what the boxes said about where they were grown, took them directly to the England Laboratory, and then went back to pickup the test results, and brought those results to the subcommittee hearings held on August 1.

Mr. VASQUEZ. Yes.

Senator MONDALE. Did you in any way tamper with or change or alter the sample from the time you brought it until you took it to the laboratory?

Mr. VASQUEZ. No, sir.

Senator MONDALE. They were in the original package when you turned them over to the laboratory?

Mr. VASQUEZ. Yes, sir.

Senator MONDALE. Very well.

At this point in the record I order printed an affidavit which you have filed with the subcommittee.

(The information subsequently supplied, follows:)

AFFIDAVIT OF MANUEL VASQUEZ

My name is Manuel Vasquez. I have been living in the Washington, D.C. area for 14 months. Prior to that, I was a farmworker in California since the age of 5 or 6. I am now 35. I am now working in Washington as the Washington representative of the United Farm Workers Organizing Committee.

Some time around the first of July it was suggested by my home office in Delano, California that area representatives look into the possibility of having grapes on retail store shelves checked for pesticide residue levels. I made several efforts to accomplish this in such a way that it would not cost the union

anything. Since the Senate Subcommittee on Migratory Labor had scheduled hearings on August 1, 1969, to investigate the Effects of Pesticides on Farmworkers, I realized the value that might come from testing grapes in the Washington area. It was either on July 29 or the morning of July 30 that the Reverend Gene Boutilier, National Director of the National Campaign for Agricultural Democracy, suggested that we test grapes before the hearing, and he noticed that the C. W. England Laboratories is located in Northeast Washington and would test grapes. We then decided to find retail food stores nearest the Lab to get samples of grapes.

At about 2:00 p.m. on Wednesday afternoon, July 30, I rode a motorcycle driven by John Walsh to a Safeway store at Rhode Island & Thayer St., N.E., to buy some grapes. When I noticed the bad condition of the grapes, I decided that a good residue test would not be possible. We then went to the Safeway store at Hamlin & 18th St., N.E. Mr. Walsh stayed outside the store and I went inside to the produce section where I noticed that the grapes were in a shelf display rather than in their original lugs. I then proceeded to the back of the store to talk to the produce manager. I asked him if the grapes were from California, and he said yes. I then asked to see the boxes and he took me to the cold storage unit where there were about half a dozen boxes. I asked him if I could copy down the name from the label and he answered that it wasn't necessary because I could just tear one off a box. I did that and submit it as exhibit 1.

I then proceeded back to the produce section and took about 1 lbs. of grapes by the stem and placed them, including their tissue wrapping, into a standard Safeway brown paper bag and proceeded immediately to the cashier where I paid about $1.00 for them.

After purchasing the Safeway grapes, I checked with the Reverend Boutilier and informed him that I had gotten grapes from Bianco at Safeway and he suggested that I go to another store and get another sample of grapes from a different grower. We then proceeded to the A & P across from that Safeway where there are no grapes. From there we went to a Giant store at about 4900 Annapolis Road.

At that Giant I went directly to the produce section where I saw Thompson Seedless grapes wrapped in plastic mesh bags in a shelf display. The grapes were not in their original lugs.

I then went to the produce manager and asked if the grapes were from California, and he said no, that the grapes were from Arizona. We went to the back room where I noticed an empty box with a Bagdasarian label. When I noticed this discrepancy, I asked to see the grapes in cold storage and he refused.

I went back to the display counter and purchased about 2 lbs. of these grapes for about $1.00. We then proceeded to the Lab on Bladensburg Road and at most it was a 15 minute ride between Giant and the Lab.

John stayed with the motorcycle and I went inside the Lab where I asked the receptionist if there was a possibility that these grapes could be tested to determine pesticide residues. She then called a chemist and I asked him if he could take tests on the grapes. He said yes. When I asked him if the test results could be ready by Thursday evening (July 31) he said that this would push him for time to do an adequate job. He then informed me that the cost for each sample would be $35 or $70 for two, which I immediately realized conflicted with the price quoted over the phone to Reverend Boutilier of 25 for both samples. In view of our need for the tests, I ordered the tests despite the high price.

At about that time I marked the bags with the names of the growers as reflected by the labels. I knew that the Safeway grapes were Bianco's and that they were distinguishable from the Giant grapes because the Giant grapes had a mesh bag. I used my pen to mark the name Bianco on the Safeway grapes and Richard Bagdasarian on the Giant grapes.

On Friday, Aug. 1, at about 9:00 a.m. I went to the England Labs, picked up the lab report, and wrote a check on the account of the Washington D.C. Boycott. At that time the same man who took the samples from me on Wednesday verbally confirmed the test results and said that the grapes had a lot of aldrin on them.

Mr. COHEN. Mr. Chairman, I would like to make a few remarks. I was testifying on August 1st. The burden of my testimony was the proposition that we believe the California table grape growers use the wrong amounts of poisons, the wrong amounts at the wrong times, and disregarded the health of the workers and consumers.

At the conclusion of my testimony, Mr. Vasquez brought the laboratory test in. I saw they were from the C. W. England Laboratories. We turned that test over to the staff of the subcommittee.

I would like to make a few comments.

Subsequent to that on August 12, Senator Murphy introduced in the Congressional Record a statement implying we had engaged in a shocking attempt to mislead the American public.

I want to present our position in relationship to that.

First of all, that presentation of August 12, on page S9868 of the Congressional Record, and as Senator Murphy has said in his opening statement this morning, Mr. Bianco signed an affidavit and said he has not used aldrin.

His commercial applicator states he has not applied aldrin.

On the very same page there is a test which Senator Murphy introduced which indicates an aldrin residue on Bianco grapes. There is an inconsistency.

The inconsistency is between the tests which Mr. Murphy introduced and the statement of Mr. Bianco and his commercial applicator.

Furthermore, since that time and according to the test which was given to the press this morning, which I now have a copy of, the Safeway Stores conducted their own independent tests of the grapes which I believe were taken not only from the warehouse but also from the sealed railway cars, some of the grapes from the same batch that these grapes were from.

One of the tests is the Eastawai tests from the Eastawai Laboratories which indicates they found 16.8 parts per million of aldrin, 17.6, and 19.1.

Now those tests of Safeway grapes confirm our tests. They were not brought to the laboratories by any farmworker.

Further, Safeway states in their letter they canceled their contract with Bianco. So in terms of the facts of that episode I think our position is surely vindicated.

I just want to make one further statement. In the statement of August 12, Commissioner Morley is quoted, and Commissioner Morley has given some information to this committee.

Commissioner Morely has been involved in a battle with the United Farm Workers for over a year now. We are trying to get records. I hope at this point the records from commercial spray applicators from Commissioner Morley's office will become public information since he seems to have given some of this information out.

That is it. Cesar is here to talk about the issue which concerns us most of all and that is the issue of how the use of economic poisons affects the health and safety of farmworkers.

Senator MONDALE. You may proceed, Mr. Chavez.

Mr. CHAVEZ. Thank you, Mr. Chairman.

The real issue is the danger that pesticides present to farmworkers. We have come to realize in the union that the issue of pesticide poisoning is more important today than even wages, although wages are very low, because we feel, the workers feel, that keeping good health is far more important than getting more money for their work at this point.

Two weeks ago, I called on the Federal Mediation and Conciliation Service to bring the growers and us together again to continue the discussions that were broken off in early July.

I also told them that the union was willing to reconsider the wage demands that we had made at that time when the negotiations broke off and that we were, by doing that, placing the issue of pesticides as the number one issue of our union and that we would not reconsider the basic demands that we made during the negotiating period with the employers.

We find it very difficult to stand by idly and let them continue the systematic poisoning of our people. We feel we must speak out and we feel some correction must come soon.

The reason that we became alarmed over pesticides, although we suspected poisoning for a number of years, is that recently there came to our hands a report from the California State Department of Public Health, a survey that the department is conducting now in the Tulare County area.

Many of the workers interviewed were grape pickers. Many of the people interviewed were the struck growers. The information is not public. We got hold of the information by one of the employees who was working with the department of public health in the survey.

An official of the department was asked why was this information being withheld from the public. The statement he made was that the subject is too controversial and, therefore, the rest of the findings are going to be kept from the public.

It is the same fight that we are in now in two or three counties in California with the agricultural commissioner, trying to get the records of the pesticides as concerns the spraying of the area and the type of poisons being sprayed. We feel that as to the extent we have this information we are going to educate our workers and we are going to try to find some kind of solution concerning the poisons.

The tests conducted by the Public Health Service showed that over 80 percent of those workers interviewed have one or more symptoms connected with pesticide poisoning.

The symptoms are identified as excessive fatigue, nervousness, insomnia, diarrhea, difficulty in breathing, headaches, skin irritations, persistent rashes, nausea, vomiting, double vision, loss of fingernails, and nose bleeds.

The data showed that out of 774 farm workers interviewed, 154 had one symptom of the symptoms mentioned. 144 had two symptoms. 109 had three symptoms. Eighty-two had four symptoms. 163 had five or more symptoms. Only 121 showed no symptoms.

The farmworkers are becoming very concerned, very aware of the poisoning, and they are now referring to it in Spanish as la muerte andando, walking death.

Most striking of all is the long-range effects that the pesticide poisoning have on our kids. We also have a study made by Dr. Mizrahi of the Salud Medical Clinic in Tulare County. It is clear to me Dr. Mizrahi state that 29 children tested showed that they had a high DDT residue in the blood.

It also showed the cholinesterase levels were low.

He described in a letter to me that the pesticide poisoning in the Valley is reaching an epidemic. Our own legal department in the union has been investigating and we have some examples of what we are finding as we made a determined effort to learn more about the poisoning and we talk to people whose work has been affected by it.

In Selma, Calif., last year farmworkers were applying pesticides. The instructions read one quart of chemicals should be mixed with a large quantity of water.

His employer had other ideas and suggested that he use two quarts instead of one. This worker used two quarts instead of one. As he began to spray he became ill, he had to be taken to the doctor; he was unable to work for several days.

Since then he has been very sensitive to any area which has been infected with pesticides.

I also may add here that pesticide poisoning is not recognized. Our people who are poisoned are not permitted to have coverage under the workman's compensation program if they miss less than 1 week of work. Large numbers of people who are ill are not able to have the proper medical attention and do not have any compensation while they are gaining their health back.

Another example: Mrs. Beatrice Roman, working for George A. Lucas & Sons, one of the growers that we are striking, this summer came into a field that had been sprayed and had a lot of white powder on the vines as she described it.

After working a few hours she began to have trouble in breathing, developed a sore throat and had difficulty in speaking and stomach pains. She left the vineyard and a few days later she felt better. She came back to work and she had the same symptoms again.

We are finding that as people get affected with pesticides it is harder and harder for them to be able to work in the fields after the first attack.

Another example: Frances Barajas in the Elmco vineyards, another large vineyard we are striking. This spring we came into the vineyard where she was working. She ran out of the field out of the way of the spray rigs to avoid being sprayed and the foreman ordered her back into the field.

She developed skin rashes, eye irritation and very serious eye infection. This party was afraid to testify; she was afraid she would lose her job.

Mrs. Celestina Perales, working at Elmco, had the same experience. In this case when the spray rig was approaching where she was working, spraying the same row she was working in, she was told by the crew foreman to hunch under the vines until the rig went by. This is common to the spray workers while they are working.

We have many reports in the Coachella Valley that this happens

frequently. She developed skin irritation and eye irritation and also trouble with her vision.

The most recent one we have is Mr. Abelardo Hernandez, a few days ago, he ate some grapes and became ill, began to vomit and had bleeding from the nose. The foreman refused to take him to the doctor.

We see that when these things happen that the foremen themselves don't know. Many times they think it is something, it is a minor incident that is going to pass. So we have reports where the foreman refuse to take people to the doctor.

In this case he did go to the doctor and he was ordered to stay off the grapes and the vineyards until he felt better.

These are a few examples of the very serious problem that we are faced with in the grapes today. The union is putting every effort forth to the end that we may be able to stop the serious situation immediately before it gets out of hand. We have tried to meet with the growers on several occasions outside the collective bargaining area.

We have invited them to meet with us separate from collective bargaining, separate from recognition, but to meet with us to discuss the pesticides.

In every attempt they have rebuffed us.

On January 7, I instructed Mr. Cohen to write a letter to Mr. Wall, a representative of the pesticide companies in the area, to try to get a meeting with him so that we could better know the full range of the pesticides and their effects and also to gain from him some knowledge as to how to protect our workers, how to protect the people. We were ignored.

On January 14 of this year, I wrote a letter to the grape growers asking them to meet with us again, not a full-scale negotiating meeting but to meet with us to talk about one thing only, pesticides. We did not get an answer to our letter. We didn't get a call from them.

During recent negotiations we tried to get the employers to understand the union's position regarding its great fear on the whole question of poisoning. After almost 2 weeks of discussion, the negotiations broke down. We said there were two issues. The whole question of wages is one and the pesticides issue, the health and safety clause that we were demanding.

We could not get any positive response from the employers. So when I called on the conciliation service 2 weeks ago, I did give in on the wage demands but we are holding firm on the question of pesticide poisoning. We have not heard from the employers to this date.

We feel that we can do much to protect the workers through contractual agreement. We know that there are certain precautions that must be taken if we are going to protect the workers.

We feel that the issue of poisoning is something that should concern everyone in the country but something that certainly concerns us and all the workers involved.

We recently renegotiated a contract with the Perelli-Minetti Co. in Delano and after several days of negotiations we were able to get them, they are the first ones to accept our demands on the health and safety.

We asked first of all that DDT be banned immediately. We asked that the employer submit to the union all the records dealing with the types of pesticides, the amounts used, the fields sprayed and date sprayed and other pertinent information the same information that we want to get from Commissioner Morley of Bakersfield which we cannot get.

That a health and safety committee, a joint committee be set up with the union and employers to deal with the health and safety of the workers, particularly pesticides. That was done, too.

We also have in the contract a testing program to determine the cholinesterase baseline for the workers and to file the findings so that we have a systematic way of tracing the workers, being able to determine the baseline, the level, so that from week to week we are able to know how many or what are the dangers presented to each worker on his own levels.

We also have in the contract an agreement that the employer will pay for the tests, about $5 per test. Also in the agreement that all of the containers, cans, sacks, and other materials, will be disposed of either by burning or by burying and that nothing will be left in the fields where someone who does not understand the danger of pesticides may be injured, especially children.

We also were able to get in the contract an agreement that the employer with the help of the health and safety committee of the workers, will provide adequate garments and tools and equipment to do the job which will bring the most safety to the workers possible.

So, our demands of the employers are not really that stringent and they can live with the demands that we have made.

As I said before, we are very concerned with the matter of poisoning of workers. We know that grapes in the supermarkets, as the report shows, are contaminated with pesticides.

We know that from all the information that we have that workers are seriously affected with the pesticide poisoning. We also know that it would be to the advantage of the employer to keep his workers healthy.

We also know that it is a very hot political issue and because of that we know that some of the agencies are not doing their job.

It seems to me that the Federal Food and Drug Administration in doing their job would have seized the grapes found in the Safeway and they would be out in the field to help us in Delano to find a way of establishing some sort of protection for the workers.

We are appreciative of your time. We are here not to condemn anyone but we are here essentially to tell all of you that we are not going to permit, we are not going to stand idle, we are not going to be a part of, the systematic poisoning of hundreds of our people in the fields.

Thank you.

Senator MONDALE. Thank you, Mr. Chavez.

Mr. Cohen, did you have a further statement?

Mr. COHEN. No.

Senator MONDALE. In our first hearings on pesticides the Food and Drug Administration statistician who deals with these problems testified that in his opinion it was not unreasonable to say that at least

800 farmworkers died annually from pesticide poisoning. Another 80,000 at least were injured in one degree or another because of pesticide poisoning.

Based upon your experience with the farmworkers in southern California, would you feel that is an exaggerated figure?

Mr. CHAVEZ. I don't Senator. If I may for a minute give you how I became aware of the pesticide poisoning. I have been with the farmworkers, organizing for them almost 20 years. Some years back we began to have people come into the union who were complaining of things that were very difficult to understand.

For instance, the very first shock I received was in 1962 when a young man came in and told me that he had difficulty, that he felt sick, weak, with headaches, but what bothered him the most was that he had double vision, he would see two images of the same object.

We took him to the doctor in Bakersfield. He could not find anything wrong with him. We took him to an eye specialist who recommended glasses. He wore the glasses for a while but he still had the vision impairment.

I think this is the first case that really drove home the point to me. Since then we have been very anxious. We have a part-time clinic in Delano run by volunteer doctors. We have been told things, for instance, a week ago last Sunday one of the doctors told me that he had found that most of the people who came to the clinic, whether ill or coming in for a checkup, ran from a half degree to a full degree higher in temperature than normal.

He also told us that they had more skin irritation problems than any others coming to the clinic. So not only recently but for many years now we have been concerned. I don't think that the HEW estimates are inaccurate in any way.

Senator MONDALE. Over the years in this work, is it your impression that the danger is getting worse for the farmworker or has the situation improved?

Mr. CHAVEZ. It is becoming worse. We also conducted our own investigation among the people. I have noted many of the people who have been in the vineyard for long periods of time, 20 or 30 years, almost everyone has skin problems in the lower portions of their sides and their legs, almost everyone.

I have talked to many of the Filipino workers who have been there the longest. Almost everyone that you talk to and if you examine his feet and legs, you will find the skin rashes and the skin problems.

So I don't think it is a mere accident. I think this occurs because of their continued exposure to pesticides.

Senator MONDALE. How does a table-grape picker get exposed to pesticides in the field? In what way does it get on him? Will you describe that for us?

Mr. CHAVEZ. The pesticide is sprayed on the vineyard, itself, on the leaf and on the fruit. They work in the fields and they handle the fruit and they handle the leaves and the vines.

So they come in contact with it because the pesticides are present in the work area. And working 8 to 10 hours a day it will get on your clothes and I am sure get onto your skin.

In some cases when they have just sprayed the fields the odor sometimes tells you quite a bit.

For instance, I get a headache any time I happen to be driving on a county road and an airplane is spraying. That is very common. Some of the pesticide will come into the car and I get a headache. I know some people cannot stand the smell of the pesticide.

One of the great problems in the past that we are now able to deal with, people felt, that is the workers, that everything on the vine was sulphur and they referred to it as sulphur.

It is only in the last 18 months they began to understand that not all the stuff on the grapes is sulphur but a lot of it is DDT and other pesticides.

Senator MONDALE. You say the worker will then be exposed to these pesticide residues by coming in contact with the leaves, that the chemicals will get on his clothes, and in his hair, and that sort of thing.

Is there ever an instance in which the worker is directly sprayed by pesticides either through drift or in other ways? Have there been examples of that?

Mr. CHAVEZ. Sir, there have been examples of directly spraying them but I will have Mr. Cohen relate some of those experiences to you.

I would like to say for instance, a community was sprayed a few weeks ago, not intentionally, but they were at the end of the field. The helicopter made a run and they sprayed right into the community. They were spraying cotton and Jerry can give you that information.

It was done in the late afternoon and all of the west side, which is the community where the workers live, was just one mess of spray, of dust. Even the schools were sprayed. Not intentionally, but when you are spraying with an airplane it is like using a shotgun, you can't confine the spray to the crop.

A case near El Centro where a plane was spraying cotton and it went into an adjacent field that had cucumbers and killed the cucumbers.

Mr. COHEN. We have a statement submitted which concerns instances in the last few months.

Petra Sisneros was working in Elmco, tipping grape bunches in May 1969, when four tractor-driven spray rigs came into the field. Without any warning, one of them came right on the spot she was working in, spraying her soaking wet and blinding her to the point she almost fell under the spray rig.

Other women workers dragged her away from the spray rig.

Mr. Giumara will testify. Mr. Aurelio de la Cruz worked for Giumara. On more than one occasion he saw spray rigs spraying ahead of the crew he was working in. His crew was told to work in the sprayed areas shortly after the spraying was concluded.

At Elmco, right in the strike zone we know about, there are many instances where the spray rig sprayed in front of the crew or sometimes on the people just as this example here, Miss Sisneros at Elmco.

Senator MONDALE. Where you have union contracts with the wine

grape growers have you included in those contracts stipulations which protect the farmworker from pesticide risks.

Mr. CHAVEZ. In the contract, the first contract that was really negotiated this year where the problems came to light and where we learned quite a bit more.

But we talked to all of the other companies that we have a contract with. We showed them what we have with Perelli-Minetti. We are in the process of reopening contracts by mutual agreement to negotiate on pesticides. We have not encountered any real opposition.

I think that the table-grape growers are opposed, not that they can't live with the clause that we want but I guess because they consider it an extension of collective bargaining which they are not prepared to do yet.

Senator MONDALE. As I understand it, then in those fields where there is a union contract, steps have been taken to try to protect the worker.

But in the fields where workers are working that have not been organized, there is little that you can do, or that is being done, in your opinion, to protect the workers from pesticide poisoning.

Mr. CHAVEZ. There is nothing the workers can do unless they are organized. The reason we are doing it at Minetti, the workers are organized and they are presenting a united front and they were able to convince the Perelli-Minetti people it was needed. The table-grape growers won't even talk to us about the problem.

Senator MONDALE. As I gather from testimony by Mr. Cohen, it is almost impossible to find out from official government records what kind of pesticides are being used by commercial applicators. And, the growers themselves refuse to respond where there is no contract. Thus, your workers really don't know what is being used, what quantity, or what kind of risks they are taking when they work in these fields. Is that correct?

Mr. CHAVEZ. That is correct. That is where the danger lies. We are convinced that it is as much to the benefit of the employers as it is to the benefit of the workers to put some kind of protection in there so that we can protect them.

Senator MONDALE. I will ask unanimous consent that the full statement of Mr. Chavez appear at this point in the record.

(The prepared statement of Mr. Chavez follows:)

PREPARED STATEMENT OF CESAR CHAVEZ, DIRECTOR, UNITED FARM WORKERS ORGANIZING COMMITTEE

On August 1st, 1969, after testifying concerning the misuse of economic poisons by table grape growers, our general counsel, Jerry Cohen, submitted to the staff of the Senate Subcommittee on Migratory Labor a laboratory test from C. W. England Laboratories in Washington, D.C. which indicated that table grapes which were purchased by Manuel Vasquez at a Safeway store in northeast Washington contained an Aldrin residue of 18 parts per million. Subsequent to that time Senator George Murphy abused his privilege of senatorial immunity by making false accusations regarding the testimony of the United Farm Workers Organizing Committee. The innuendo in Senator Murphy's remarks in the Congressional Record of August 12, 1969, is that the farm workers tampered with the grapes. I can assure you that this is false.

I am confident that our position will be vindicated in this hearing and that the reports which have been received concerning the fact that Safeway con-

ducted its own independent tests which confirmed our tests and subsequently cancelled its contract with Bianco are accurate reports.

The real issue involved here is the issue of the health and safety not only of farm workers but of consumers and how the health and safety of consumers and farm workers are affected by the gross misuse of economic poisons.

The issue of the health and safety of farm workers in California and throughout the United States is the single most important issue facing the United Farm Workers Organizing Committee. In California the agricultural industry experiences the highest occupational disease rate. The rate is over 50% higher than the second place industry. It is also three times as high as the average rate of all industry in California. Growers consistently use the wrong kinds of economic poisons in the wrong amounts in the wrong places in reckless disregard of the health of their workers in order to maximize profits. Advancing technological changes in agriculture have left the industry far behind in dealing with the occupational hazards of workers which arise from the use of economic poisons. This problem is further compounded by the fact that commonplace needs such as clean drinking water and adequate toilet facilities are rarely available in the fields and are also deficient in many living quarters of farm workers, especially of those workers who live in labor camps provided by the employer.

In California an estimated 3,000 children receive medical attention annually after having injested pesticides. There are over 300 cases of serious nonfatal poisonings annually, most of which occur in agriculture. There are some fatal poisonings which occur annually in agriculture. In addition to this, literally thousands of workers experience daily symptoms of chemical poisoning which include dermatitis, rashes, eye irritation, nausea, vomiting, fatigue, excess sweating, headaches, double vision, dizziness, skin irritations, difficulty in breathing, loss of fingernails, nervousness, insomnia, bleeding noses, and diarrhea.

The misuse of pesticides is creating grave dangers not only to farmworkers but to their children as well. Dr. Lee Mizrahi at the Salud Clinic in Tulare Country has recently conducted a study relating to nutrition, parasites and pesticide levels. Dr. Mizrahi chose his samples by inviting every fifth family who came to his clinic to participate in a free complete study of their children. Sixty families participated to date and 170 children have been tested. Dr. Mizrhi has reported to the United Farm Workers Organizing Committee that though the results of the test are not complete, based on the findings already received there are pesticide levels which can only be described as epidemic.

Thus far, on 29 children tests, 32 of the 84 reported values have fallen outside normal limits. Dr. Mizrahi has informed me that as a practicing physician he would be greatly worried if he found 10% of reportedly normal children outside normal limits. In this case he is frightened. These farm worker children are suffering from high levels of DDT in their blood and from low cholinesterase levels in their blood plasma.

Recently the state director of public health, Dr. Thomas Milby, said that there is ample evidence of many unreported poisonings in agriculture. Dr. Milby is currently conducting an investigation in an attempt to get an accurate picture of pesticide poisonings among the workers. The state of California is not releasing the data from this investigation. As an article in the Fresno Bee by Ron Taylor claims this study is headed by Mr. Henry Anderson who would not answer questions concerning the factual findings of the study to date because "the subject is too controversial." According to Mr. Taylor's article an undisclosed number of farm workers are reporting symptoms of pesticide poisoning. Many of these workers do not go to the doctors ordinarily but suffer in silence what they feel is an occupational hazard. The adverse effects of chemical poisons are so pervasive that they are considered by farm workers to be part of their way of life. They are accepted. One of the interviewers who is helping the state to conduct this investigation has informed the United Farm Workers Organizing Committee that of the 774 workers who filled out questionnaires which are now in the possession of the state, 469 of the workers had worked in the grapes and 295 had not worked in the grapes. Among the 774 farm workers, the following symptoms caused by pesticide poisonings were reported: Eye irritation, 548; Nausea or vomiting, 141; unusual fatigue, 145; unusual perspiration, 159; headaches, 309; dizziness, 115; skin irritation,

249; difficulty in breathing, 188; pain in the fingernails (some workers lost their fingernails), 52; nervousness and/or insomnia, 122; itching in their ears, 12; nose bleeds, 25; burning and sorethroats, 51; swollen hands and feet, 7; loss of hair, 4; diarrhea, 2.

One hundred and fifty-four of the workers reported having one of the above symptoms, 144 reported two of the symptoms, 109 reported three, 83 reported four, and 163 reported five or more symptoms. Only 121 of the 774 workers studied reported none of the above symptoms. This study was limited to a relatively small country, Tulare, which is immediately north of Delano.

Dr. Irma West who works in the State Department of Public Health has written many articles concerning the occupational hazards of farm workers. Some of the examples of injuries are as follows:

On a large California ranch in the fall of 1965 a group of Mexican-American workers and their families were picking berries. None could understand or read English. A three-year-old girl and her four-year-old brother were playing around an unattended spray rig next to where their mother was working. The four-year-old apparently took the cap off a gallon can of 40% tetraethyl phyrophosphate (TEPP, a phosphate ester cholinesterase inhibitor) pesticide left on the rig. The three-year-old put her finger in it and sucked it. She vomited immediately became unconscious, and was dead on arrival at the hospital where she was promptly taken. TEPP is the most hazardous of all pesticides in common use in agriculture in California. The estimated fatal dose of pure TEPP for an adult is one drop orally and one drop dermally. The child weighed about 30 pounds.

Because of engine trouble, an agricultural aircraft pilot attempted a forced landing in an unplanted field. The plane rolled into a fence and turned over. The hopper of the airplane contained a dust formula of TEPP, another of the phosphate ester pesticides. The estimated adult fatal dose of TEPP concentrate is one drop orally or dermally. The pilot was not injured but was covered with dust. He walked a distance of 50 feet to a field worker, stated he felt fine, and asked for a drink of water. After drinking the water, he began to vomit and almost immediately became unconscious. By the time the ambulance arrived, the pilot was dead and the ambulance driver, the pathologist, and the mortician became ill from handling the body.

During this past summer in the grapes alone and largely in the Delano area the following incidents have been brought to the attention of our legal department.

On May 16th, 1969, Mrs. Dolores Lorta was working for labor contractor Manuel Armendariz in a table grape vineyard owned by Agri-Business Investent Company. Without warning, an Agri-Business spray rig sprayed the row she was working on, and Mrs. Lorta was sprayed all over her body with an unknown mixture of chemicals. Shortly thereafter, she experienced difficulty in breathing. She told her forelady, who responded that the spraying had nothing to do with that; that she must have had that difficulty before.

The next day she felt quite sick and large red blotches had appeared on her skin. She went to work that day but was unable to continue and hasn't been well enough to work since. She has suffered from continuing sores and rashes all over her body, headaches, dizziness, loss of weight, and her condition still continues. She has received no compensation from her employer as yet, and she has had to pay for her medical care herself.

Mr. and Mrs. Abelardo de Leon, and their teenage children, Juan and Maria, worked picking grapes for labor contractor Manuel Armendariz in vineyards owned by Agri-Business Investment Company during July and August of 1969. From the start of their work there, Mr. de Leon suffered rashes all over his body, which lasted until they quit. Mrs. de Leon began to suffer extremely irritated and swollen eyes as soon as they started working there and one eye is still somewhat swollen. The irritation ceased when she quit, and has not reoccurred though she has returned to work in a different crop since then. Both the de Leon children, along with their mother, suffered eye irritation while working for Armendariz, and often their eyes would water profusely throughout the working day. When this was brought to the attention of Armendariz, he laughed and called them cry babies. He did not suggest that medical help was available for the family under the workman's compensation program, and as a result they had to make do with drugs and home remedies. Though the de Leons were not sprayed on directly, there was a heavy white dust on the

vines and grapes which they picked. They saw no signs warning of the ill effects of this chemical spray, nor did they receive any warning or advice about it whatsoever. The de Leon family eventually stopped working for Armendariz because of the ill effects they were suffering from the chemical poisons on the grapevines.

Mr. Gregorio Sisneros was engaged in spraying a vineyard in the Selma area in 1968. According to directions which came with it, he mixed one quart of economic poison with a large quantity of water. But his employer told him to add in another quart of poison, and so he did. After spraying this mixture for a short while he became ill and had to be taken to a doctor immediately. After receiving medical treatment he was confined to his home and unable to work for some days. Since then he has been sensitive to chemical spray and has become ill several times.

While working the vineyards of George A. Lucas & Sons this summer, Mrs. Beatrice Roman developed trouble breathing, sore throat, difficulty in speaking, and stomach pain. Each day her condition would improve as she left the vineyards, and it would worsen as she began work the following morning. There was a heavy white powder on the vines which she was working among. Mrs. Roman has worked in other crops without experiencing such illness. She has been informed by her physician that it is due to the spray residues on the vines. She stopped working for Lucas, because the illness caused by the sprays, on August 4, 1969. She has been unable to work more than very little since then because of the continuing effects of the illness.

Mr. Mauro Roman (Beatrice's husband), along with his son, Jose, and a neighboring family all worked picking grapes in the vineyards of Lamanuzzi and Pantaleo in August 1969. All suffered severe skin rashes over their bodies, with cracked and peeling skin. All left this work after several weeks, and improved sharply as soon as they left. There was a very heavy white powder on the vines and grapes they were picking there.

After working in the vineyards of D. M. Steele for several days, Mr. Juan Q. Lopez developed trouble breathing, rashes on his neck and face, numbness in his left arm and upper left chest, headache and irritated eyes. There was a white powder on the vines. Mr. Lopez's condition began to improve when he stopped working in these fields.

While working picking grapes in a Caric vineyard about 10 days ago, Mr. Abelardo Hernandez ate some grapes from the vine. Shortly thereafter, he began to vomit and to bleed from the nose. His foreman refused to take him to a doctor until other workers finally convinced him to do so. The doctor who treated him said his illness was due to the grapes and the chemicals on them. He has suffered from this illness on and off since then.

During this season, Mrs. Dominga F. Medina has worked in vineyards near Richgrove. She has seen spray rigs spraying liquid preparations on the vineyards only a short distance from where she and the other members of her crew were working. She has suffered from bloody nose, eye irritation, and headache while working in these vineyards.

Aurelio de La Cruz worked with Giumarra Vineyards in the spring of 1969. On more than one occasion he saw spray rigs spraying right ahead of the crew he was working in; his crew was told to work in the sprayed areas shortly after the spraying was concluded. He suffered eye irritation and skin rashes on these occasions.

Mr. Claro Runtal suffered very severe rashes and dermatitis on his legs and neck while working in vineyards of Richard Bagdasarian from December 1968 to June 1969. Many of the other men in the crew suffered skin irritations during the same period from the chemical dusts which had been applied to the vines.

Juanita Chavera was working in the Elmco vineyards in the spring of 1969 when she developed, as a result of the spray residue on the vines, skin rash, eye irritation, and hands swollen so badly that her ring had to be cut off. Other women in the crew including Mrs. Chavera's sister, Linda Ortiz, suffered similar symptoms.

Maria Serna also working in the Elmco vineyards in May 1969, where she developed irritated eyes, headaches, and severe dizziness. Her daughter, Alicia Ramona, suffered rashes and eye irritation.

Frances Barajas also worked in the Elmco vineyards this spring. While she was working there, a tractor spraying a liquid economic poison came through

the vineyard in which she was working. She ran out of the field because she did not want to get sprayed, but a foreman ordered her to go back in and get back to work. She later talked to the tractor driver, who said he had been ordered to spray there by one of the Elmco supervisors. While working there she developed skin rashes and eye irritations that led to a serious eye infection. She has been afraid to complain about the poisons for fear of being fired.

Rafaela Ayala worked in the Elmco vineyards in the same crew as Mrs. Barajas. When the tractor sprayed the field they were working in she immediately began to vomit and her eyes became very irritated; they are still sore. She stopped working for Elmco as a result.

Mrs. Celestina Pereales was working in the Elmco vineyards in May 1968 when a tractor spray rig approached the row her crew was working in. Her supervisor told them to hunch down under the vines while the spray rig sprayed them. Not knowing better at the time, she did so. Her eyes became red and watery right away, and became persistently irritated, and she has had eye trouble ever since.

Mrs. Josefina C. Moreno was working in a crew leafing vines in the Elmco vineyards this spring. A spray rig came through the vineyard one row away from where the crew was working, and she and other women got sprayed soaking wet, but were put back to work after five minutes.

Petra Sisneros was working in the Elmco vineyards, tipping grape bunches, in May 1969, when four tractor driven spray rigs came into the field. Without any warning, one of them came right over the spot she was working in, spraying her soaking wet and blinding her to the point that she amost fell under the spray rig. Other women workers dragged her away from the danger of the spray rig. Her supervisor did not take her to a doctor until she became visibly sick. Until then she had merely been told to sit in the shade under the vine. She was vomiting a great deal by this time. After she was taken to a doctor, who gave her an injection and bathed her eyes, she was returned to the vineyards where she had to wait for a ride home until her co-workers were finished for the day. She was extremely ill for the next 10 days with vomiting, nausea, trembling, dizziness, headache, difficulty in breathing, tightness of chest, and difficulty in sleeping. To date she has received no compensation from her employer. She is still suffering from the aftereffects of this illness. When she asked her supervisor and foreman what kind of chemical she had been sprayed with, they claimed they didn't know and said it was not their fault she had been sprayed.

Alfonso Pedraza was also sprayed by an Elmco spray rig while working in its vineyards in the summer of 1969. The spray hit him on is back. When he saw a doctor three days later, his back was very red and the skin was cracked. The rash spread all over his body, and he developed muscle stiffness and eye irritation as well.

The carelessness with which economic poisons are applied in this area is such that farm workers are endangered outside the fields as well as within. About a month ago, while Petra Ojeda was working in a Tulare County orchard, the grower's tractor driven spray rigs sprayed her car and the cars of other workers which were parked along the road nearby. Mrs. Ojeda's young child was in the car asleep, along with food for lunch for the entire family. The child was covered by a blanket, but her bottle was covered with spray. The entire car was white with the chemical spray.

The James Morning family didn't even have to leave their home in order to be sprayed with economic poisons. In May, 1969, their country home was sprayed by an airplane which was applying poison to a nearby field. All six members of the family were hit with the spray, causing rashes, cracked skin and irritated eyes.

The United Farm Workers Organizing Committee is attempting to solve this pervasive problem by the collective bargaining process. We have recently attained what is for farm workers an historic breakthrough in our negotiations with the Perelli-Minetti Company. We have completed negotiating a comprehensive health and safety clause which covers the subject of economic poisons. It includes the following protections:

HEALTH AND SAFETY

A. The Health and Safety Committee shall be formed consisting of equal numbers of worker's representatives selected by the bargaining unit and P–M

representatives. The Health and Safety Committee shall be provided with notices on the use of pesticides, insecticides, or herbicides, as outlined in Section D 1, 2, and 3.

The Health and Safety Committee shall advise in the formulation of rules and practices relating to the health and safety of the workers, including, but not limited to, the use of pesticides, insecticides, and herbicides; the use of garments, materials, tools and equipment as they may affect the health and safety of the workers and sanitation conditions.

B. The following shall not be used: DDT, Aldrin, Dieldrin, and Endrin. Other chlorinated hydrocarbons shall not be applied without the necessary precautions.

C. The Health and Safety Committee shall recommend the proper and safe use of organic phosphates including, but not limited to parathion. The Company shall notify the Health and Safety Committee as soon as possible before the application of organic phosphate material. Said notice shall contain the information set forth in Section D below. The Health and Safety Committee shall recommend the length of time during which farm workers will not be permitted to enter the treated field following the application of organic phosphate pesticide. If P–M used organic phosphates, it shall pay for the expense for all farm workers, applying the phosphates, of one base-line cholinesterase test and other additional such tests if recommended by a doctor. The results of all said tests shall be immediately given by P–M to the Health and Safety Committee.

D. P–M shall keep the following records and make them available to each member of the Health and Safety Committee:

1) A plan showing the size and location of fields and a list of the crops or plants being grown.

2) Pesticides, insecticides, and herbicides used, including brand names plus active ingredients, registration number on the label, and manufacturer's batch or lot number.

a) Dates and time applied or to be applied
b) Location of crops or plants treated or to be treated.
c) Amount of each application
d) Formulation
e) Method of application
f) Person who applied the pesticide.
g) Date of harvest.

SANITATION

A. There shall be adequate toilet facilities, separate for men and women, in the field, readily accessible to workers, that will be maintained in a clean and sanitary manner. These may be portable facilities and shall be maintained at the ratio of one for every 35 workers.

B. Each place where there is work being performed shall be provided with suitable, cool, potable drinking water convenient to workers. Individual paper drinking cups shall be provided.

C. Workers will have two (2) relief periods of fifteen (15) minutes which insofar as practical, shall be in the middle of each work period.

TOOLS AND PROTECTIVE EQUIPMENT

Tools and equipment and protective garments necessary to perform the work and/or to safeguard the health of or to prevent injury to a worker's person shall be provided, maintained and paid for by P–M.

Senator MONDALE. Senator Murphy.

Senator MURPHY. I have only a few questions.

With respect to the incidents that were recounted about the people being caught in the spray rigs, is it known what pesticides was being sprayed at that time?

Mr. CHAVEZ. No. We don't know because all these cases that have been cited have been where we were striking. We can't get the information from them.

We have tired to go around and get the information from the

County Agricultural Commissioner who has not given it to us, so we have this problem, we don't know.

Senator MURPHY. In other words, you think that there very definitely should be the information as to what pesticides are being used?

Mr. CHAVEZ. I think, Senator Murphy, that if we could get from the employers the type of pesticide, when it was sprayed, in what area, plus other pertinent information, I think this would be enough for us then to be able to educate the workers and let them know what is being sprayed and then try to also establish some kind of time limit from the time that they are sprayed until the time the field would be safe for the workers to go back in.

Senator MURPHY. I hope we can get some of that tomorrow from some of the witnesses who are coming in because I am just as interested in getting that information as you are. I am just as interested in the health of the workers.

One concern that I have, one thing that impelled me to ask for the reopening of the hearing was the fact that your counsel Jerry Cohen stated that aldrin had been found on grapes grown in a certain vineyard and the man who had that vineyard said he had not used aldrin, he had never used aldrin.

What was the reason for the discrepancy? I think you can understand that. I was interested in finding out if he did not put the aldrin on how did the aldrin get on the grapes? If he says he didn't use any but we have proof from a laboratory that there was aldrin, we have a right to know how this came about. This was the purpose of my asking for the reopening of the hearing.

The rest of the testimony I have read very carefully, the effects, bad effects. There is no question but that the committee will be very much interested in looking into that.

Thank you very much.

Mr. CHAVEZ. Senator Murphy, there are two tests that showed there was aldrin in the Safeway grapes. I understand Safeway conducted its own tests and found that the tests conducted by the England company for us had the same amount of aldrin or something very close to it.

Senator MURPHY. They were different amounts. I put all the tests I could get into the record because I wanted to have them available so that we could study them. Some showed there was aldrin, some showed there was aldrin in very high degree, some showed there were traces of aldrin.

As I said, my concern is if there is aldrin on the grapes and the growers said they didn't use any aldrin, I would like to know what the game is.

Mr. CHAVEZ. Perhaps the pesticide applicator, the contractor—many of the growers do not do the spraying themselves but they contract with spraying companies—perhaps they are the parties who would know, better than the employer.

A lot of spraying, as you know, is done by commercial applicators. They are the ones that really sort of act as watchdogs for the employers on the bugs, you know, and many times we know in the place we have contracts that the employer does not even have to

worry about the bugs because the commercial applicators—that is part of the service they perform—determine what kind of poison is going to be sprayed.

Maybe in this case instead of asking the employer we should be asking the commercial applicator.

Senator MURPHY. Good. I hope we will be able in these 2 days of hearings to find out and be able to ascertain if there is this amount of poisoning put in food this has to be stopped. There is no question about that.

Mr. CHAVEZ. I agree with you, it has to be stopped.

Senator MONDALE. Senator Cranston.

Senator CRANSTON. While you could not ascertain the nature of the spray that was used in the incident, where workers were sprayed, Mr. Cohen, or in other instances where you could not ascertain the nature of the spray involved, has there been illness following the spraying of workers or other bad after effects?

Mr. COHEN. Yes. Some of the symptoms are developing of immediate rashes which later may crack open and bleed. Dizziness, in some cases double vision, headaches, nausea.

Senator CRANSTON. This has immediately followed people being sprayed from planes and otherwise?

Mr. COHEN. That is correct.

Senator CRANSTON. Are there any laws or regulations that control when spraying can be done? What is done to protect workers and others nearby when spraying occurs?

Mr. COHEN. One of the problems, and I talked about this on August 1st, concerns the current limit that the State employs when for instance parathion, which is a nerve gas, is sprayed.

In our hearing to get the records in January from the Kern Country Superior Court, we were involved in a suit with Commissioner Morley to get those records, Mr. Lemmon testified that in certain cases workers can go into the field 10 to 14 days after parathion is sprayed.

We had access to an article by Mr. Lemmon which indicated in one or more cases workers in Delano had become sick 33 days afterwards.

I think currently not enough is known about whether or not the grower is following the label instructions. Often they don't. They don't know how parathion breaks down in various weather conditions. The regulations are not adequate and are not being enforced.

As long as we don't have access to the records to see what is being sprayed, we can't see that they are enforced.

Senator CRANSTON. Is there no law requiring that workers be removed from a field prior to the use of spray?

Mr. COHEN. Yes, but there is no way to enforce the law because there is no way now to see what the commercial applicators are spraying.

These records are being hidden from us. We don't know if a particular grower uses parathion. We don't know when he has used it. When the sign is put up we don't know when the sign comes down if it came down at the proper time.

One of the deficiencies in the California law now is if the grower

uses his own private apparatus to spray the materials he does not have to account even to the agricultural commissioner as to what he has used or when he used it.

Senator CRANSTON. There is no control over the mix, so there can be an overdose as you said earlier. Is that correct?

Mr. COHEN. That is correct.

Senator CRANSTON. Is there any way a grapepicker can know how recently a field has been sprayed at the time he goes into that field?

Mr. COHEN. Only after he has been injured. Then he has a right to know but there is no way to prevent those injuries.

Senator CRANSTON. Are there any steps the workers can take on their own initiative to protect themselves other than through contract negotiation?

Mr. CHAVEZ. I don't know of any way.

Senator CRANSTON. Thank you.

Senator MONDALE. Would you yield there?

In our first hearing on this issue, we had Dr. Johnson, the head of HEW's Consumer Protection and Environmental Health Service, and we asked him the same question, what is the role of the Federal Government in protecting the workers from pesticide and herbicide poisoning?

I must confess that I did not understand the answer. Apparently the role, if any, is a very negligible one.

Have you ever seen a Federal agency involved in the protection of workers in Southern California from pesticide poisoning?

Mr. CHAVEZ. No, we have never seen any agency involved. We haven't seen or heard or any agency even make an inquiry or even suggesting that they want to be involved.

The union has never had an inquiry from any of the governmental departments showing any interest and concern for pesticide poisoning of workers, none at all.

Senator MONDALE. Senator Schweiker.

Senator SCHWEIKER. Thank you, Mr. Chairman.

Have you folks submitted to the committee any of the work of Dr. West? I see in your testimony you refer to Dr. West's work and you refer to the fact that she has written several articles or a number of articles.

Does the committee have these articles or may we have them if you haven't submitted them?

Mr. COHEN. On August 1, I submitted a copy of one of the articles. We do have with us the original of some other articles. We can get those xeroxed and submit those after the hearing.

Senator SCHWEIKER. I think it might be helpful to have them.

Senator MONDALE. It's my understanding that the articles by Dr. West, as well as other pertinent materials, have already been made part of the record of August 1.

Senator SCHWEIKER. How long has Dr. West been working in this field, approximately?

Mr. COHEN. She has been working in the field over 10 years.

Senator SCHWEIKER. Is she pretty much the leading authority on this subject, or one of the few who has done work in this field?

Mr. COHEN. She is the only member of the California State De-

partment of Public Health that has written extensively about farmworker problems. She is currently in the injury control project of the Department of Public Health. She says in a declaration which she submitted in one of the cases filed that she has held various medical positions in the Bureau of Occupational Health for 17 years.

She has written numerous articles. In this statement she states that there are over 600 pesticides in the United States right now that are put out under 60,000 different trade names. She has written articles about the effect of pesticides on workers.

She has articles that have specific examples of injuries that occurred in California fields. I would be happy to give the information to the staff. They can sift through it to decide what they want.

Senator SCHWEIKER. I would like to pursue a question asked earlier about notice of spraying, a California law or Federal law pertaining to what anybody engaged in this occupation must do.

Do I understand correctly that there are regulations governing these which you say are not being followed? Or are there not adequate regulations? Which is your basic position?

Mr. COHEN. Let me explain the legal framework we have to deal with. For example, if a grower has to spray parathion he is supposed to put up a notice as to when a field becomes safe.

There are two problems. The first problem is that if the commercial applicator has applied the parathion, those records that account for how he has applied it, when he has applied it, go to the county agricultural commissioner.

For over a year now we have been involved in a battle with the county agricultural commissioner to obtain those records.

From the point of view of the worker, you don't have a record as to when the stuff was sprayed, you don't know if the particular site is complying with the regulations because, say, the sign goes up on July 1 and it comes down 10 days later, if you don't know the date when that parathion was put on, we don't know if the sign came down too fast.

If the grower chooses to do his own spraying, in California today he does not have to account to the agricultural commissioner, he does not have to fill out a form.

Senator SCHWEIKER. He is not accountable in any way?

Mr. COHEN. He has to put the sign up but he does not have to account to the Commissioner as to what he used or when he used it. There is no way of checking it to see.

If he put up a sign throughout the month of May we can't go to the commissioner's office to find out what he used. We don't know if he had a legal duty to put that sign up because he is not accountable to anybody.

Senator SCHWEIKER. To get this spray, does he have to comply with any regulations or is it openly available to him?

Mr. COHEN. There are permit systems. He has to apply for permits. Interestingly enough in the case of aldrin, we approached the agricultural commission of Riverside County and he said it is not on the injurious or restrictive materials list.

What we find when we go and ask to look at the permits is that growers will often checkoff the most or many of the pesticides which

give their men the right for that year to use those pesticides. Just because a grower has applied to use a certain pesticide does not inddicate whether in fact he will use it and when he does use it if he does use it.

Senator SCHWEIKER. I gather from what you say there are regulations that there must be some warnings given to workers when spraying occurs.

Are you saying in most cases warnings are not given, or is it more often than not that they do give warnings?

What is the general practice now giving warnings, such as in the cases he cited here in his testimony about spray rigs coming in unexpectedly?

Mr. COHEN. In the Delano area we don't see any signs at all. We have no way of checking whether or not there should be signs because we don't have access to the records indicating what the growers have used.

Senator SCHWEIKER. Is it your point that there has to be better enforcement of State laws or that Federal laws are needed? How do you think the general situation could be cleared up more easily?

Mr. CHAVEZ. I think, of course, the best way of enforcing the whole pesticide issue is through collective bargaining. This ten would have the workers and employers dealing with the immediate problem right at the place of employment. In fact, I think that until that happens we won't have real effective enforcement because our experience has been throughout the years that it does not really matter what kind of legislation is passed, to get it enforced when it gets down to the enforcement at the ranch level it is very difficult. We have in many instances another regulation.

So while some Federal legislation would be helpful, certainly, once that is achieved the whole problem will be who is going to enforce it, how is it going to be done.

Senator SCHWEIKER. In your testimony you cite one example of collective bargaining where you have entered in a health and safety agreement. Is this the only one to date, or are there others?

Mr. CHAVEZ. This is the model one, the one that we think will give the workers maximum protection. We have in the other contracts some protection, especially dealing with prottective garments. But in the Perelli-Minetti agreement that one is effective because we also got the company to agree not to use certain chemicals which is I think the biggest breakthrough.

Senator SCHWEIKER. You do have some other contracts with some protection in them?

Mr. CHAVEZ. Yes, sir.

Senator SCHWEIKER. How many other contracts do you have, roughly?

Mr. CHAVEZ. About 50 ranches covering about eight other employers.

Senator SCHWEIKER. That is all, Mr. Chairman.

Senator MONDALE. Senator Kennedy.

Senator KENNEDY. Mr. Chavez, I want to extend a warm word of welcome to you for your appearance here before the committee. I think each and every time you have come before this committee or

other committees in the House of Representatives or Senate, we certainly gain immeasurably a better understanding of the problems of the many hundreds of thousands of people that you represent. I think it gives us a better insight into the problems of housing, health, and education of great numbers of Spanish speaking people in not only Delano, in California, but in other great areas and sections of our country.

I know you are here on a matter which is of great importance and significance today, the question of the pesticides, but just before getting into that, I would like to ask you, I know you have had a very difficult health problem, you have been recovering and gaining strength and I am wondering personally how are you feeling now? Have you recovered your strength? Are you feeling better?

Mr. CHAVEZ. Sufficiently enough to be here and to do some traveling. I am not completely well, but I feel much better.

Senator KENNEDY. I think, just personally, you have been a great inspiration to many people. At a time when there is such tension on extreme measures and violence and disorder, I think you have really reflected in your own personal conduct the highest standards of integrity, and I think this adds immeasurably to the kind of representations you have made before the committees of the House of Representative and Senate as it does add to the impact of your words whenever you speak.

I want to say how glad I am that you are here today.

As I understand the terms of your earlier response to some of the inquiries which were made, you feel that this whole issue of the question of the pesticides would be immeasurably reduced if you were able to enter into collective bargaining agreements with many of the growers themselves. However, I notice that some States have passed laws which would restrict the use of DDT, such as Arizona and Michigan. I understand further that even the State of California has passed legislation in the State Senate which prohibits the use of DDT by 1972. I don't believe that it has passed the legislature completely.

I am wondering if you feel that this will be really time enough, even if it is able to pass the legislature of California in terms of the lower house, still if the Californians have to wait and the American public has to wait for prohibition against DDT, whether you represent that this does really constitute danger to the consuming public?

Mr. CHAVEZ. I think such a danger must be met immediately, I don't see that the State legislature in California is going to ban DDT. There is a lot of political opposition to it. It seems to me that if we wait much longer we are all going to be in trouble, not only the farmworkers and consumers, but on questions like DDT, although I am not a scientist by a long shot and I know very little about it, I do know that if you start using DDT you are going to affect the whole environment.

You see what is happening in places far away from California. We know that California is the biggest user of DDT, and has been through the years. We know that even if some legislation is passed it is going to be difficult to enforce it because the whole tradition of labor enforcement or, rather, labor enforcement in the field, has been almost nil. We see it today in our strikes.

Although we welcome legislation we can't expect it is going to end the problem even if legislation banning DDT would be passed. We think the direct way of dealing with it would be by the employees and employers getting together and having some agreement. Then the union can enforce the regulation. What happens with the problem when the employees do not have a stick is that we then have to go to the Federal Food and Drug Administration. We get no recourse. In California, we have to go to the agricultural commissioner who, instead of making those records public, won't do it and we have groups in the county who can go to the local judges and get a restraining order keeping the commissioner from giving us the records. It becomes a whole political mess.

So we never get to the job that has to be done. It seems to me that not only for the protection of the workers but the protection of the whole environment something has to be done and done right away. For some strange reason we have more concern for animals than we do for human beings, and especially the plight of farmworkers. We have heard reports where the agricultural commissioner gets very upset because DDT is sprayed in the vicinity where cattle are grazing. We have never known that today he gets upset because workers are sprayed while they are working. I think we are running out of time.

The other big problem is that it seems to me that they—are using a lot more spray and pesticide now than they have in the past. While I don't have concrete evidence we see in the early mornings of the day when the planes are spraying and we see those airfields, those makeshift airfields, cut in the ranches, you know, in greater and greater numbers.

It seems to me we are in a never-ending fight with the pesticides. The more we spray, the more resistance they create and the more we have to spray. It seems to me at times that this committee ought to make a real detailed study of the whole problem. I am sure you are going to find that the danger is very imminent.

Senator KENNEDY. Assuming, therefore, that certainly one of the keys would be collective bargaining, and that you did make some kind of agreement with the Perelli-Minetti Company; did they feel that your request for this kind of model agreement in terms of protection of the health would establish standards which were prohibitive to them in terms of being economically viable? Did they think your requests were unreasonable?

Mr. CHAVEZ. No, they didn't. Again it was the question of the danger to the workers who were exposed to them. Once they were able to see that it was very great they made up their minds it was something profitable instead of something they could live with. We had a lot of discussion but not really opposition to this once we were able to show them that workers were being affected directly.

We had in the contract, we not only got a ban on DDT, but we got a ban on some of the other hard chemicals that are in the DDT family. If they can do it I am sure everybody else can.

Senator KENNEDY. Have you had any kind of indication of interest by other growers, as well, that they would follow what has been established in the Perelli-Minetta understanding?

Mr. CHAVEZ. We called on the whole table-grape industry about 2 weeks ago. We asked them to resume negotiations. As you recall, when the negotiations broke the two main issues were wages and pesticides. I stated to them through the press that we were willing to reconsider the wage demand. We wanted a $2 minimum. We were willing to reconsider that, but that we were not going to reconsider the whole question of safety for workers.

We hoped this would be enough of an incentive for them to join us in negotiations. What we did, really, was that we contacted all the workers and we took votes on whether they agreed with us, with the proposal we were asking, whether pesticides were the most important. Every one agrees because where grapes are concerned there is danger. The workers agreed so we made the proposals to the employers. Even with that kind of porposal we haven't heard from them yet. They should be concerned.

I think they are not concerned because they are not used to being made responsible for those things they do on the farm that would help their workers. It is foreign to them. No one can tell them what to do on the farm. I think the workers at least have the right to tell them jointly to decide how they are going to approach the pesticide-poisoning problem.

Senator KENNEDY. You indicate in your testimony that individuals have been affected by the use of pesticides—even have died from it. I am wondering, are there any remedies or recourse which the families or the individuals can take to recover—from either growers or the users of pesticides—because of this?

Mr. CHAVEZ. None that we know of. There are a few, about three farm workers that filed suit against their employers to see if they could check the danger that way, but there is no way by which a farmworker can go out to the employer and demand protection. Not only that, but as they get into the field this type of injury is not accepted yet, so they don't qualify for workmen's compensation, if they have not missed more than 1 week either for the medical benefits or the compensation. Workers have been in the field for a number of weeks and they can't qualify for those benefits, however small they are. There is nothing they can do.

Senator KENNEDY. So they are not able to qualify for workmen's compensation; they are not able to pursue their rights against the growers themselves; they just have to take it as part of the problems of working in the fields for growers that use pesticides, is that right?

Mr. CHAVEZ. Unless they are successful in their attempt to organize and when that comes they will have some remedy.

Senator KENNEDY. Your interests are in terms of the protection of the workers themselves from the kinds of poisoning which has affected them and which you document in your testimony, as well as being able to protect the consumers in the results of these pesticides on their health?

Mr. CHAVEZ. That is right.

Senator KENNEDY. You feel this could be done through the process of collective bargaining. You have submitted what has been your agreement with the Perelli-Minetti Company which will certainly

make public the kinds of action that these growers are taking in using these pesticides?

Mr. CHAVEZ. That is correct. We feeel that if we are able to protect the workers that the byproduct of that will be protection for the consumers. We know there is pesticide on the grapes. Our experience and tests have proved, we have had several tests done throughout the country and it is there. We feel that we must protect the working person and that is how we can get to protecting the consumer.

Senator KENNEDY. Even with the possibility of some States passing legislation which would affect it, you feel that really the effective way of getting this done is by permitting the unions themselves bargaining collectively in this area, and to be able to publish the kinds of information which would provide very clear evidence as to exactly what pesticides are being used, when they are being used, and that this will provide the consuming public of this land with additional protection which they are not getting at the present time?

Mr. CHAVEZ. That is correct.

Senator Kennedy, we are pretty much in the same predicament that the mine workers were when they were organizing. Mine safety was a big issue with them. Mine safety did not really come until the union was strong enough to enforce that safety. Although there were a lot of hearings on mine safety it wasn't until the workers had the strength to enforce it that they could really get down to deal with the basis of it. I think we are in the same position here.

Senator KENNEDY. The things pointed out, for example, the Mine Safety, Fair Labor Standards Act, so many pieces of legislation have been written in by the Congress to protect the workers themselves, with the exception, for example, of the Coal Mine Safety bill which is before us on the floor, and hopefully by the time it passes it will also have a provision in there to protect the individuals, the workers themselves, that when they have complaints, for example, in terms of health and safety that they can report these complaints because they are the ones who come in contact and know more about it without having recriminations against them.

I think the points you make here that the workers in the field have the best information, the best understanding, the knowledge of what is really being used in terms of these pesticides, other kinds of chemicals which are sprayed on them, that can be a source of great strength and protection for the consumers of these products?

Mr. CHAVEZ. One of the things in legislation that makes it very difficult to protect the worker is to get that worker to make the complaint. If he is not protected then he will lose his job and most workers are not going to complain because they are afraid of losing their jobs. This is where we have to work.

Senator KENNEDY. I want to thank you very much for your testimony and comments, Mr. Chavez. They have been most helpful.

Mr. CHAVEZ. Thank you.

Senator MONDALE. I have one last question: Do you sense that in addition to problems that you referred to thus far in terms of worker protection from pesticide poisoning, that there is evidence that many in the medical profession do not know how to accurately identify pesticide poisoning? I think you mentioned some time back

that for one person who was obviously poisoned the physician had prescribed new glasses. Is there evidence that the medical profession might not know in many cases how to identify pesticide poisoning?

Mr. Chavez. The limited experience that we have had with the medical profession in this type of case indicates that they don't know how to deal with it yet. For instance, there has to be a program that is going to first of all determine what is the cholinesterase level of the blood of workers. That is not being done and it will not be done because the workers are poor and they can't have tests made. There aren't any facilities. If the worker should be infected with TB, there are facilities to deal with that. If he should be poisoned, there are absolutely no facilities, no knowledge. So we take workers in to doctors repeatedly. What we get is that they are most usually asked to stay home and rest for a couple of days and they will be better. They will probably give them a shot or some pills. No one really knows at this point how to deal with it. There is really not that involvement or concern. We hope that through hearings and other people becoming aware we will be able to reach the individual's problems.

Senator Mondale. Are there any other questions?

Senator Kennedy. Could you tell us how your movement for organizing is going? Will you give us a resume?

Mr. Chavez. It is going well considering all the opposition that we have. For instance, the Pentagon has become the number one strikebreaker. They are taking up the slack that is being created in the market by the boycott.

Senator Kennedy. I understand they say that the troops over in Vietnam are beginning to like grapes a little better now that the boycott is being more successful. I don't know what the American taxpayers are paying to send grapes over there. I know they are paying a good deal more since your grape strike.

Mr. Chavez. They are feeding the boys there about eight pounds per man.

We also see that the grapes are quite an item in the black market. We have reports they are selling for $42 a box in Saigon. The growers are getting about $3.50 a box for them.

Senator Kennedy. Are these California grapes that are going on the black market in Saigon.

Mr. Chavez. Yes. We don't know how they get there by they are on the black market. One grower, Jerry will testify, was speaking at a meeting of the growers. The other was bemoaning the fact that he was not getting part of that action, he was only getting $3.50 a box.

Senator Kennedy. Where are they getting the grapes? Are you suggesting they are coming from military stocks of some kind?

Mr. Chavez. We don't know how they are getting there. We do know that they are finding their way into the black market. Some fellows over there write to us. We have a boycott going over there by some of our friends. They are very active and they keep reporting to us. In several cases they turn the grapes back to the cafeteria. That of course is a very difficult problem when you have to take on the growers and then you have to take on the Army, the Marine Corps, the Coast Guard, and the Navy.

Senator CRANSTON. Perhaps you need an Operation Intercept for grapes.

Senator KENNEDY. Mr. Chavez, in terms of attempting to continue your efforts, in terms of this development of bargaining with these growers, getting an understanding, a further understanding of your aims and aspirations, this continues to go forward, does it?

Mr. CHAVEZ. It continues to go forward at a regular speed. There is a lot of interest not only in strikers—you see, the longer we struggle in Delano the more we help the cause throughout the country for the farmworkers. A few years ago few people knew outside the farmworkers what we were doing. I think there are only a few who don't know now. Also, as the story comes out of Delano, as the movement progresses, we are able to attract more and more participation from the other segments of the community, including some real awareness now in Mexico among the people who come across the side of the border to begin to do something themselves so they will not be used as strikebreakers.

I hope that the employers will come to their senses. We are sure sooner or later they will have to recognize the union. The sooner I think it will be the better for everyone.

Senator KENNEDY. Do you get better understanding from the Labor Department about the enforcement of certain laws and regulations in terms of strikebreakers themselves, to restrict the entrance of green carders in areas where there are strikes? Are you getting any better understanding or sympathy?

Mr. CHAVEZ. None at all. We have more wetbacks in California in the strike zone now than we ever had before. Large numbers of them are breaking strikes. No possible way we can enforce that. In the first place, we can't go into the fields, we can't go into the camps.

Secondly, the Immigration Service is not enforcing it. The border patrol is not doing its job. We know they are there. There are union people working in every crew in the land. It is our purpose to have them there so we can get the information. They know who the wets are. They know their names or the names that they are using. It makes no difference. We give the information to the border patrol and they don't do anything. In fact, they will go out and investigate our picket line. Very seldom will they go into the fields.

The same thing with the question of green carders. It is just a farce. They have not done anything. I don't think they are about to do anything.

On the whole question of the company union, the episode in Delano was organized by Mr. Guimarra and some of the other growers. We have irrefutable evidence they provided money, provided the technical know-how for organizing, and held meetings in their own offices, and did the actual recruiting of the people they put in charge of the union. All this information was discovered partly from the information that the permanent labor investigator was able to obtain. We have been with that case now for almost a year. Nothing has happened. Nothing is about to happen.

Senator KENNEDY. Of course you have the 72-hour pass provisions, too, white carders, without any kind of enforcement. Do you find—certainly I do—that the Congress and the Senate in voting on the Bracero question made a national judgment to really proscribe

what had been effectively slave wages and slave labor in this country at one time 3 or 4 years ago, and still it continues by the kind of loopholes you understand and speak so well about in terms of the green carders, the white carders, the breakdown——

Mr. CHAVEZ. And no-carders.

Senator KENNEDY. And no-carders. And still this continues and still we have no action.

Mr. CHAVEZ. The said thing is that the employers think that they find a loophole to break a strike. In the final analysis they are just postponing the day when they will pay for that because they are depending too much on that kind of labor to do their work, break a strike, and to continue harvesting. What they are doing is discouraging the American workmen from continuing in the field. Sooner or later this other program will be stopped and they are going to be in a fix to get a work force. It prevents the union from coming in and helping them stabilize the work force that is going to be there to provide the work that they need when they need it.

I think they are working against themselves. It is difficult to them to think in terms of the 20th Century when they are a couple of centuries behind in terms of labor relations.

Senator KENNEDY. Thank you very much.

Senator MONDALE. I want you to know that there is possibly some evidence that the boycott may not be succcessful in all its intended purposes. I came across a story the other day, a true story. A mother and her 3-year-old daughter went shopping at a D.C. supermarket. The 3-year-old looked up at the grapes and said, "Mommie, can we buy some boycotts?"

Mr. CHAVEZ. The longer it lasts, the more people will come off grapes. If I were an employer I would be signing a contract today.

Senator MONDALE. Thank you, Mr. Chavez.

Mr. CHAVEZ. Thank you very much.

Senator MONDALE. Our next witness is Dr. Windlan of the C. W. England Laboratories.

STATEMENT OF HAROLD M. WINDLAN, PH. D., DIRECTOR, THE C. W. ENGLAND LABORATORIES, WASHINGTON, D.C.

Dr. WINDLAN. Mr. Chairman.

Senator MONDALE. Dr. Windlan, we appreciate your coming here this morning. I think it is fair to state for the record that you did not volunteer to be a witness. You indicated that you would be willing to testify. You thought the initial report in August which you prepared was adequate, but you nevertheless agreed to be here.

With that understanding, if you will permit the committee to ask such questions as they feel have a bearing on your tests, we would be most grateful.

Dr. WINDLAN. That is correct.

Senator MONDALE. Will you tell us in your own language which tests you conducted on table grapes, the dates, and the circumstances surrounding them. We will submit for the record, at this point, the test reports and analysis called Certificate of Analysis on each of those products.

(The material referred to follows:)

SAFEWAY STORES, INCORPORATED

6700 Columbia Park Road, Landover, Maryland 20785

September 17, 1969

Senator Walter F. Mondale
Chairman
Subcommittee on Migratory Labor
Room 443
Old Senate Office Building
Washington, D. C.

Dear Senator Mondale:

Thank you for your letter of September 9th requesting information concerning our Company's tests as related to pesticide residues on table grapes.

For your information, we are attaching reports and other data dealing with the laboratory tests which we undertook on August 1, 1969 concerning the above product. We have also outlined the actions taken in chronological order to further clarify our situation.

Two of our Company representatives met with Mr. Boren Chertkov on Friday, September 12th, in the offices of the National Association of Food Chains, and relayed the attached information to him.

Again, thank you for your letter and we hope that the enclosed data will be of assistance to you.

Best regards,

Sincerely,

Basil Winstead
Vice President & Div

BMW/es
Attachments

August 1st - Grapes identified as purchased at Safeway introduced into hearings.

Safeway Stores, Incorporated, Washington, D. C. Division, notified two laboratories to sample test the grapes that had been received by Safeway. (C. W. England Laboratories, Eastawai Research Laboratories)

August 2nd - Product samples of grapes were selected by the above two laboratories.

August 6th - C. W. England reported preliminary results via telephone. Results indicated chemicals present which California Department of Agriculture reported had not been used. Laboratory requested to re-check results and tests.

August 7th - Strasburger and Siegel, Incorporated contacted and requested to sample test the product.

August 8th - Division Office received telegram with information from California Department of Agriculture saying that presence of non-toxic sulphur could be confused with other elements.

All three laboratories contacted by phone with the above information relayed to them along with request to re-check results.

Company notified supplier to temporarily suspend shipments of product until test results clarified.

August 9th - Phone report from Eastawai on tentative test results.

August 12th - Food and Drug Administration report published.

August 14th - Written report from C. W. England (attached dated August 8th). Phone report from Strasburger and Siegle (attached written report dated August 15th).

August 15th - Eastawai phone report. (Attached written report dated August 15th)

August 19th - Company notified supplier to resume shipments.

August 20th - Written notification to all laboratories requesting clarification of test results as related to article which appeared in Journal of Agricultural and Food Chemistry, Volume 15 entitled, "Identification of the Aldrin Artifact" by J. R. Pearson, F. D. Aldrick and A. W. Stone. (Letters and article attached)

September 10th - Response to the August 20th letter by Strasburger and Siegel. (Attached)

No response to-date from C. W. England Laboratories or Eastawai Research Laboratories

HAROLD M. WINDLAN, PH.D., DIRECTOR TELEPHONE LAWRENCE 6-1110

THE C. W. ENGLAND LABORATORIES, INC.

Consultants and Analysts to the Dairy and Food Industries
Water and Food Analyses - Pesticide Residue Analyses
Bacteriological - Chemical - Physical

2710 BLADENSBURG ROAD, N.E.
WASHINGTON D.C. 20018

CERTIFICATE OF ANALYSIS

(A.O.A.C. and A.P.H.A. Methods)

August 1, 1969

Product Thompson Seedless Grapes

Received from United Farm Workers - Organizing Committee AFL/CIO, 945 G Street, NW, Room 207, Washington, D.C. 20001

Date Received July 30, 1969

REPORT

CHLORINATED HYDROCARBONS

THOMPSON SEEDLESS GRAPES	0.11	ppm	SIMAZINE
(Richard Bagarian - Mecca, California)	1.04	ppm	ALDRIN
THOMPSON SEEDLESS GRAPES	0.27	ppm	SIMAZINE
(Bianco Fruit Corporation - Chellchella Valley,	1.31	ppm	BHC
Theral & Mecca, California)	18	ppm	ALDRIN

ppm - Parts per million.

All results are in terms of Product.

All results are accomplished by use of gas chromatography.

THE C. W. ENGLAND LABORATORIES, INC.

per Harold M. Windlan

HMW/jmp

STRASBURGER & SIEGEL, INC.

CHEMISTS AND FOOD TECHNOLOGISTS

BACTERIOLOGISTS

1403 EUTAW PLACE BALTIMORE, MARYLAND 21217

Tel: 523-5518 - 5519

August 15, 1969

CERTIFICATE OF ANALYSIS

(A. O. A. C. AND A. P. H. A. METHODS)

Laboratory No. 12388

Sample of Cranes (See Below)

Received from Safeway Stores, Inc. Landover, Md.

Marked Sampled by M.S. 8/7/69 (See Below)

REPORT

2 lb. Composite Sample taken from 10 boxes, representing a shipment of 3000 boxes (26 lbs. each)

Sample of: Thompson Seedless Cranes - 26 lb. net wt.
Anthony Brand
California Fruits Growers & Shippers
Bianco Fruit Corp.
Main Office, Fresno, Calif.

Chlorinated Pesticide Residues by Electron Capture Gas Chromatography

Kelthane - 0.20 ppm
DDT - 0.11 ppm
Other Chlorinated Pesticide Residues - None

Organophosphate Pesticide Residues by Thermionic Detector Gas Chromatography - None

STRASBURGER & SIEGEL, Inc.
Strasburger & Siegel, Inc.
ANALYSTS

Eastawai
RESEARCH LABORATORIES
INCORPORATED

TOXICOLOGY DIVISION

234 E. 25th STREET BALTIMORE, MARYLAND 21218 Area Code 301 889-7804
889-1609

15 August 1969

CERTIFICATE OF ANALYSIS

LABORATORY NO. : SF02086901

SAMPLE OF : Red, Green & Black grapes.

RECEIVED FROM : Safeway Stores, Inc.
6700 Columbia Park Road
Landover, Maryland 20785
Warehouse at Cabin Branch Road.
Mr. Leo Corsentino, Public Relations Manager.

DATE OF RECEIPT : 02July69

REPORT

A. OBJECT:

To determine the pesticide content in each of the three grape samples provided.

B. SUMMARY:

TLC - All (3) three grape samples were positive for chlorinated pesticide residues.
G C - Positive for Aldrin and Dieldrin.
Total Pesticide residue in Red grapes = 16.8 ppm.
Total Pesticide residue in Green grapes = 17.6 ppm.
Total Pesticide residue in Black grapes = 19.1 ppm.
These results are in gross violation of accepted standards.

C. PROCEDURE - THIN LAYER CHROMOTOGRAPHY:

a. 25 gms of each of the grape varieties were placed into a flask of suitable size.

b. To each flask was added 1000 ml of Hexane saturated with N.N.- dimethyl formamide.

c. Each of the flasks were stoppered with saran covered rubber stoppers and shaken on a mechanical shaker for 5 hours.

d. The super-natant liquid was then drawn off, measured, and evaporated under vacuum to dryness.

e. The residue was then re-dissolved in 1.0cc hexane and chromatographed.

D. STANDARD INFORMATION

Maximum allowable hygienic standards as established by the American Conference of Governmental Industrial Hygienists for specified agricultural commodities are 0,0.1,0.25 and 0.57 ppm

LABORATORY NO. SF02086901

by weight for Dieldrin and 0, 0.1, 0.25 and 0.75 ppm by weight for Aldrin.

E. REFERENCES

a. Industrial Hygienic and Toxicology, Second Revised Edition, Vol.2, pgs 1356 thru 1359.

b. Official Methods of Analysis of the Association of Official Agricultural Chemists, Tenth Edition, with official revisions.

c. Gas Chromatographic Analysis of Drugs & Pesticides by Benjamin Grendcinowicz, pgs. 408 - 512

Respectfully submitted,

Director of Laboratories

HAROLD M. WINDLAN, PH.D., DIRECTOR

TELEPHONE LAWRENCE 6-1110

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WASHINGTON, D. C. 20018

COPY

CERTIFICATE OF ANALYSIS
(A.O.A.C. and A.P.H.A. Methods)

August 8, 1969

Product Grapes

Received from Safeway Stores, Inc. - Produce Merchandising Department, 1501 Cabin Branch Rd., Landover, Maryland 20785 - Attention: Mr. Allen Lewis

Date Received August 4, 1969

REPORT

	CHLORINATED HYDROCARBONS	
Thompson Seedless Grapes (Anthony Bianco brand)	0.65 ppm 0.03 ppm	Aldrin Simazine
Black Grapes (Anthony Bianco brand)	0.05 ppm	Aldrin
Red Grapes (Anthony Bianco brand)	0.03 ppm	Aldrin
Castys Red Grapes	0.03 ppm	Aldrin

ppm - Parts per million.

All results are in terms of Product.

All results are accomplished by use of gas chromatography.

The extract from the Thompson Seedless Grapes was processed using a second method (paper chromatography). This method also shows the presence of Aldrin.

THE C. W. ENGLAND LABORATORIES, INC.

per Harold M. Windlan

HMW/jmp

HAROLD M. WINDLAR, PH.D., DIRECTOR

TELEPHONE LAWRENCE 6-1110

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WASHINGTON, D. C. 20018

COPY

CERTIFICATE OF ANALYSIS

(A.O.A.C. and A.P.H.A. Methods)

August 8, 1969

Product Grapes

Received from Safeway Stores, Inc. - Produce Merchandising Dept., 1501 Cabin Branch Road, Landover, Maryland 20785 - Attn: Mr. Allen Francis

Date Received August 6, 1969

REPORT

CHLORINATED HYDROCARBONS

Thompson Seedless Grapes (from rail cars)	0.32 ppm	Aldrin
	0.04 ppm	Simazine

ppm - Parts per million.

All results are in terms of Product.

All results are accomplished by use of gas chromatography.

THE C. W. ENGLAND LABORATORIES, INC.

per Harold M. Windlan

HMW/jmp

Senate MONDALE. Before you do so, will you give us a little of your background and experience in this field?

Dr. WINDLAN. Yes, sir.

My name is Harold Milton Windlan. I have a degree from the University of Georgia. I have both my bachelor of science and my master of science degrees from the University of Georgia. I have a doctor of philosophy degree from Cornell University. I have been in the field of chemical analysis or analysis of food for the past 14 years.

I received my doctorate from Cornell in 1955, and I have been in my present employment for 10 years. I started there in September of 1959.

We have over the years analyzed practically every kind of food that is known, and for the past approximately 7 years we have done a fantastic amount of work in pesticide residue analysis. Of course, our first entry in the field was back in the days of pesticides in milk locally. From that we have analyzed all kinds of feeds, foods, animal parts, and various and sundry samples. I would hesitate to even estimate the number of samples but it has been in the thousands.

Senator MONDALE. So for several years it has been your chief or sole function: to test, and make these kinds of analyses, in the food area?

Dr. WINDLAN. It has been one of our major tasks, correct.

Senator MONDALE. Will you then tell us about the first analysis of grapes brought to you by the farmworkers?

Dr. WINDLAN. Yes.

A representative of the United Farm Workers brought two samples of Thompson seedless grapes to our laboratory on the afternoon of July 30, 1969. The grapes were identified as being from Mecca, Calif., one from the Bagarian Orchard or Vineyard, and the other from the Bianco Fruit Corp. From that I personally took the grapes and immediately started the analytical work because they were insistent to have this on a given day. It was a tough one, timewise, but the time was sufficient.

With due process we got to them. We promised a result on August 1, and the result was given August 1.

Senator MONDALE. What did that analysis disclose?

Dr. WINDLAN. It disclosed that one sample of grapes was very high in aldrin. It had more BHC on it than I would like to see. It had some simazine on it.

Senator MONDALE. Do you know what are the FDA permissible standards prescribed in the aldrin field?

Dr. WINDLAN. In the aldrin field, according to the results, or according to the literature that I see, it is 0.1 part per million.

Senator MONDALE. This first test came out what?

Dr. WINDLAN. Eighteen parts per million.

Senator MONDALE. As I understand it, you don't know where the sample was obtained, what was done to it, all you know is what happened after it was put in your hands, the survey made and the analysis is as you have found it?

Dr. WINDLAN. That is absolutely correct. I did not know anything

about the history of the grapes or the intended use of the analytical results.

Senator MONDALE. There has been some suggestion on occasion of aldrin being confused with sulfur. Can you tell us whether, based on your professional knowledge, your result setting forth this aldrin is such that we could be certain, at least in your judgment, that there is no such confusion?

Dr. WINDLAN. In my judgment there is no such confusion. My reasons are, number one, the results that were reported on this report dated August 1 were accomplished using recognized techniques as published by the Federal Food and Drug Administration. Our final results were obtained using gas chromatography. Gas chromatography is a highly sensitive method. When samples are processed using this technique only certain compounds will come through.

Second, the residue or the amount of material that was left over from this particular injection in our gas chromatography was subjected to a second method of analysis, to wit, paper chromatography, and it does have a migration or an RF value that is exactly the same as aldrin.

Now I would be the first to say that, yes, we do know other pesticides are present on these grapes and there were others present, period. We did not attempt to identify them.

Senator MONDALE. When you used the paper chromatography test was that for the purpose of making certain that there was not confusion as between sulfur and aldrin?

Dr. WINDLAN. Yes, sir.

Senator MONDALE. Is this the recommended test in this field?

Dr. WINDLAN. I guess today the more sophisticated test would be thin layer chromatography. I do not happen to have the equipment. I have run thousands of paper chromatograms so we elected paper. Both methods appear in the FDA pesticide manual.

Senator MONDALE. It is your judgment, based on your professional background, you are satisfied that what you tests disclosed were aldrin and not sulfur?

Dr. WINDLAN. I am satisfied that the aldrin reported on test reports was in fact aldrin.

Senator MONDALE. Will you give us the background on the second test which I understand was performed at the request of Safeway Stores?

Dr. WINDLAN. Yes, sir.

Senator MONDALE. And tell us how you gathered the sample, from what sources, and what those tests disclosed.

Dr. WINDLAN. Safeway Stores requested that we visit their warehouse in Landover, Md., and sample the grapes they had in the warehouse for pesticide residue analysis. On Saturday morning, I believe August 2—the date may be off a day or so, but it was a Saturday morning—I went to the warehouse, we went through the grapes. They had four different kinds of grapes. They had a red grape, they had a second kind of red grape which is a Castys Red. You could see the difference in the grapes. I did not know one variety from the other, personally. They had a real dark black grpae, and of course the Thompson seedless grape. They had many flats of each grape.

I immediately surveyed the situation and estimated in my own mind how many grapes were in the warehouse. From this I immediately in my mind took a rough square root of that figure and decided this was the number of boxes that I would sample. I would actually remove some grapes from each of the boxes. This is what I did.

The Thompson seeldess grapes, they had a lot of them in the warehouse that day. I don't know how many but if I remember correctly, I think there were something in the neighborhood of 1,000 boxes. I sampled a minimum of 30 boxes. In other words, I put my fingers in actually 30 boxes of grapes and took grapes out of each box.

I took this out to the lab on Saturday. We are not officially open on Saturday. I put them in the refrigerator. On Monday morning I started the analytical work. We took a cross section of the cross section because, again, you start off with not 2 pounds of grapes but you start off with something in the neighborhood of 100 grams of grapes. Our analyses were set up on 50 grams of grapes, which is roughly 2 ounces. We rendered a report dated August 8 on the samples that were obtained.

Senator MONDALE. What did that analysis disclose in respect to aldrin?

Dr. WINDLAN. With respect to aldrin, it showed that the Thompson seedless grapes again were on the high side, not drastically high, but the black grapes and the two red grapes were well within tolerance.

Senator MONDALE. I see your analysis says that the Anthony Bianco brand was on the Thompson seedless grapes. How did you determine that?

Dr. WINDLAN. This was the label on the box.

Senator MONDALE. Did you also make a precautionary survey to determine that you were not confusing aldrin with sulfur in this case?

Dr. WINDLAN. Not in this case, no, sir.

Senator MONDALE. You performed two tests for Safeway, one on the second of August, the other on the 6th. You took some from the warehouse in the first case and some from the rail cars in the second. Is that correct?

Dr. WINDLAN. The first test reported was on samples received August 4 was from the warehouse. The one on samples received August 6 was from the rail car.

Senator MONDALE. The first survey showed 0.65 parts of aldrin, that is on the Thompson seedless.

Dr. WINDLAN. Yes.

Senator MONDALE. On August 6 your survey showed 0.32 parts of aldrin on Thompson seedless found in the rail cars, is that correct?

Dr. WINDLAN. That is correct, sir.

Senator MONDALE. Do you have a copy of your August 8 report?

Dr. WINDLAN. Yes, sir.

Senator MONDALE. I have an analysis that says August 8 and date received August 4.

Dr. WINDLAN. Yes, sir.

Senator MONDALE. On the bottom of that you said that these grapes were processed using a second method, paper chromatagraphy. Then you did use it.

Dr. WINDLAN. In that survey I did use it.

Senator MONDALE. On the August 6 one you did not?

Dr. WINDLAN. I did not.

Senator MONDALE. On August 6 you simply used gas chromatography?

Dr. WINDLAN. Gas chromatography only.

Senator MONDALE. On the date received, August 4, what that means was that you received the grapes probably on August 2, you are not quite sure, it was a Saturday?

Dr. WINDLAN. I am positive it was on a Saturday.

Senator MONDALE. They were put in refrigeration and your office opened on August 4?

Dr. WINDLAN. That is the reason for the date of August 4. The work commenced on them then even though I personally obtained grapes on the Saturday prior.

Senator MONDALE. Senator Kennedy.

Senator KENNEDY. I have no questions.

Senator MONDALE. Senator Murphy.

Senator MURPHY. I don't have any questions. I am not questioning the results of the laboratory tests.

Dr. WINDLAN. Thank you, Senator Murphy.

Senator MURPHY. I wonder if you might have any explanation as to why the content would vary from the same vineyards, the same shipment, the same boxes, the same flats, the same types of grapes, that one would have a 0.32 part per million aldrin and in some other cases it dropped down to 0.03. Would conditions change that if they were sprayed similarly?

Dr. WINDLAN. Senator Murphy, I am strictly an analytical chemist. Anything I would say would be from a layman's point of view. I personally have grapes in my back yard and I spray my grapes. I spray them with pressure equipment. It is small. I know I can look at a bunch of grapes on the vine and say that looks beautiful. I say, "I will sock some spray to it." I don't think the commercial sprayer will do this but the same type of thing can happen because this is equipment that is putting out gallons of material. I think it is quite easy for the sprayer to put out what I would call in a layman's term a slug of liquid material as compared to a heavy fog mist which I think is the desirable thing.

Senator MURPHY. How long would the evidence of aldrin remain on the grapes after they have been sprayed?

Dr. WINDLAN. Senator Murphy, again this would be conjecture. I do not know.

Senator MURPHY. I am not a chemist, myself. I don't know either. I have no further questions. Thank you very much.

Senator MONDALE. Senator Cranston.

Senator CRANSTON. In addition to pesticides, are herbicides used? Do you have any knowledge as to any danger involved?

Dr. WINDLAN. No, sir, I do not. Again I am strictly an analytical chemist and I am not familiar with that.

Senator CRANSTON. Since you are unable to answer Senator Murphy's question about how long pesticides are dangerous on grapes, how can we go about getting that information, in your opinon?

Dr. WINDLAN. I think in my opinion the proper thing to do would be to actually spray grapes with known concentrations of the various and sundry pesticides by themselves, also in conjunction one pesticide with the other, and actually store these under typical conditions and analyze them over a period of weeks, possibly even months, after harvest with the knowledge of date of application, with a good record of weather conditions prior to harvest, and then we can have some factual evidence, I think, and I think some of this evidence is available if we can put any reliability into the actual application of pesticides to grapes today. This I can not answer one way or the other.

Senator MURPHY. Did anybody say they would like to find out whether there was one pesticide or another on these particular grapes, or were you just asked to test them generally?

Dr. WINDLAN. I was asked to make a general test for the——

Senator CRANSTON. Do you have any information as to what can be done to clean grapes after they have been sprayed, or if there are lasting effects if they are not treated?

Dr. WINDLAN. Personally, at home we wash them in water, but I know we are kidding ourselves. This is all we do.

Senator CRANSTON. Do you consider that adequate?

Dr. WINDLAN. No, sir. I didn't eat many grapes this year, thank you.

Senator MONDALE. Senator Schweiker.

Senator SCHWEIKER. Thank you, Mr. Chairman.

Doctor, I would like to go back to your first set of tests. You tested samples from two different vineyards. Is that correct?

Dr. WINDLAN. This is the way they were identified to us, Senator.

Senator SCHWEIKER. One, you said, had 18 parts per million of aldrin.

Dr. WINDLAN. Yes, sir.

Senator SCHWEIKER. That was by Bianco.

Dr. WINDLAN. Yes.

Senator SCHWEIKER. The other had what?

Dr. WINDLAN. One had 1.4.

Senator SCHWEIKER. What is the accepted tolerance?

Dr. WINDLAN. 0.1.

Senator SCHWEIKER. In both cases they were over the accepted tolerance.

Dr. WINDLAN. Yes, sir.

Senator SCHWEIKER. Your second series of tests, again in reading the results as a layman, do I understand that in your report dated 15th of August all three grape samples were substantially over the level? Is that correct?

Dr. WINDLAN. No, sir. The report dated——

Senator SCHWEIKER. I am sorry, I have the wrong sheet.

You tell me again what your results were on the second.

Dr. WINDLAN. On the second test we took a test on the grapes from the warehouse, the reporting date August 8, the sample

received as August 4. Thompson seedless grapes had 0.65 parts per million aldrin, which is over the tolerance. The other three varieties of grapes were under tolerance.

Senator SCHWEIKER. The ones that were 0.65——

Dr. WINDLAN (continuing). Were Thompson seedless grapes.

Senator SCHWEIKER. From where?

Dr. WINDLAN. From the Anthony Bianco brand.

Senator SCHWEIKER. Were all those you tested in the second series of tests from Bianco, or were they different?

Dr. WINDLAN. The red grapes were not identified as being a Bianco product. There was no label as to the location of the grape. The only label was the kind of grape.

Senator SCHWEIKER. Were you instructed in your original request to just test Bianco grapes or take a cross section?

Dr. WINDLAN. At Safeway we were told to take a cross section of the grapes in the warehouse.

Senator SCHWEIKER. Regardless of where they were located?

Dr. WINDLAN. Yes, sir.

Senator MONDALE. I am told that Safeway, which has cooperated with this, told us that all these grapes were from Bianco. That is what they told us.

Dr. WINDLAN. I cannot vouch for that. On the fourth grape, the Castys Red, I don't know where they were.

Senator SCHWEIKER. Currently is Safeway still buying Bianco grapes or not?

Senator MONDALE. We have a statement from them which we included in the record. I will ask counsel to point out what the situation is.

Mr. CHERTKOV. One of the exhibits supplied by Safeway shows that on August 8 the company notified the suppliers that they had suspended shipments. On August 19 shipments were resumed.

Senator SCHWEIKER. Those are all the questions I have.

Senator MONDALE. One final question, Dr. Windlan. As I understand it, Safeway selected you, and asked you to come out and take these samples?

Dr. WINDLAN. Yes, sir.

Senator MONDALE. They did so on two occasions with results which your certificates set forth?

Dr. WINDLAN. Yes, sir.

Senator MONDALE. Have you often been used by Safeway for food analysis?

Dr. WINDLAN. I have been used by Safeway considerably for food analysis work. This is my first entry into pesticide on grapes for Safeway.

Senator MONDALE. But Safeway has often used your laboratory?

Dr. WINDLAN. We have a contract with the ice cream department of Safeway. We do all of their laboratory work. We do work for the milk department of Safeway. The coffee department for Safeway has been more or less split in half. They had what they called their table products division. We were doing all their work but they have since abandoned that division and we no longer work for them.

Senator MURPHY. I am interested in another question, if I may,

Dr. Windlan. In doing all the work for Safeway, do you find the presence of injurious pesticides in other areas, for instance in lettuce and field vegetables, besides grapes?

Dr. Windlan. Senator Murphy, we have never investigated their lettuce or any of these items for pesticide residues.

Senator Murphy. Thank you.

Senator Mondale. Thank you very much, Dr. Windlan. We are most appreciative of you for cooperating with the committee.

Dr. Windlan. I hope I have been able to shed some light on it. We feel we have done the best job we could, and these are the answers we gave.

Senator Mondale. We are most grateful.

Dr. Windlan. Thank you.

Senator Mondale. Our final panel this morning is composed of representatives from the Food and Drug Administration.

We appreciate your presence here. I understand you have a prepared statement.

STATEMENTS OF DR. H. L. LEY, JR., COMMISSIONER, FOOD AND DRUG ADMINISTRATION; J. KENNETH KIRK, ASSOCIATE COMMISSIONER FOR COMPLIANCE; DARRYL E. BROWN, SUPERVISORY CHEMIST, NEW YORK DISTRICT; ALVIN L. GOTTLIEB, DEPUTY ASSISTANT GENERAL COUNSEL, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, FOOD, DRUG, AND ENVIRONMENTAL HEALTH DIVISION; AND JERRY BURKE, ACTING HEAD, HOLOGENATED COMPOUNDS SECTION, RESIDUE CHEMISTRY BRANCH, DIVISION OF PESTICIDES, BUREAU OF SCIENCE

Dr. Ley. Yes, Mr. Chairman.

The panel members here with me today, going from my extreme left, are Mr. Darryl Brown, who is Supervisory Chemist of the New York City District of the Food and Drug Administration. On my immediate left, Mr. Kenneth Kirk, Associate Commissioner for Compliance.

On my right Mr. Alvin Gottlieb, Deputy Assistant General Counsel of the Department of Health, Education, and Welfare in the food and drug area. I provided for the reporter appropriate names and titles.

Mr. Chairman, immediately following the hearings before your subcommittee on August 1, 1969, the Food and Drug Administration made a survey of table grapes on the retail market to determine if unsafe pesticide residues were present.

Forty-eight samples were collected as follows: 12 samples of grapes were collected from retail stores in each of four metropolitan areas—Los Angeles, Chicago, New York City, and the Baltimore-Washington, D.C. area.

We specifically requested that samples be collected from the Safeway Store and the Giant Supermarket here in Washington, D.C., from which a United Farm Workers representative informed us he had purchased the grapes for the analysis reported by Mr. Jerome Cohen to your subcommittee on August 1. We were able to obtain a

sample at the indicated Safeway Store, but we did not find a Giant Supermarket at the address given to us. We did, however, obtain a sample from another Giant Supermarket further out on the named street. These samples were collected on the afternoon of August 1, 1969.

In addition to these 48 samples, our San Francisco district collected 12 samples of grapes from packers or shippers in the San Joaquin Valley of California. Our Chicago district also collected an additional 12 samples from produce houses and our Los Angeles district collected three more samples from packers in Mecca, Calif.

All of these samples were collected during the period from August 1 to August 6, 1969. They were promptly analyzed for pesticides by our district laboratories in Los Angeles, San Francisco, Chicago, New York, and Baltimore.

The gas liquid chromatographic analytical procedure used in this survey detects and measures about 60 pesticide chemicals, including aldrin, dieldrin, kelthane, endrin, DDT and its analogs, tedion, heptachlor, heptachlor expoxide, ethion, lindane, parathion, methyl parathion, and diazinon. Only residues of kelthane, DDT compounds ethion, tedion, dieldrin, and diazinon were found in the samples. All residues were substantially below tolerances. No residues of aldrin were found.

We submit for the record the results of this survey showing the grower or packer, the area where samples were collected and the analytical findings: exhibit A.

Since that survey, we have continued our normal pesticide residue surveillance work on raw agriculture products. As part of this program, our San Francisco District has, as of September 23, 1969, collected and completed the examination of 12 additional samples of grapes from packers or shippers in the San Joaquin Valley of California.

These samples have been examined for pesticides using the same method as mentioned before. None of these samples were found to contain pesticide residues over tolerance, in fact nine of the samples were free of any residue detectable by the method employed. The residues on the other three samples were substantially below tolerance. We submit for the record the results of these analyses also; exhibit B.

Mr. Chairman, you requested that I discuss the legal framework under which we regulate pesticide residues in or on foods and how a residue tolerance is established.

Regulation of the use of pesticides is carried out by several agencies. The responsibility for registration of pesticides and other economic poisons is placed in the U.S. Department of Agriculture. These products may not be legally shipped in interstate commerce without prior registration as required by the Federal Insecticide, Fungicide, and Rodenticide Act. To be registered, the pesticide must be shown to be safe when used as directed and effective for the purpose claimed on the label.

Under the pesticide chemicals amendment to the Federal Food, Drug, and Cosmetic Act, ran agricultural commodities bearing or containing residues of pesticides and pest control products, not gen-

erally recognized as safe by qualified experts, are classed as adulterated unless such residues are within the limits of previously established safe tolerances, which may even be zero.

Such tolerances are established only after the USDA has certified that the pesticide chemical is useful to agriculture when employed as proposed in the petition. Also, the petitioner must present FDA with experimental evidence on toxicity to establish what residues are present and that such residues will be safe. He must show that the tolerances can be met under the practical conditions of pesticide usage.

The petitioner must also specify the conditions of use on the labeling for the pesticide. Exemptions from the requirement of a tolerance are also authorized if not inconsistent with the public health. Raw agricultural products are defined to include all foods in their raw or natural state.

The industry or firm promoting the use of the pesticide chemical is responsible for obtaining and submitting proof that any residue remaining on food is safe for the consumer of that food. The Food and Drug Administration is responsible for the scientific judgment concerning the safety of a tolerance. In arriving at a decision that a proposed tolerance is safe, Food and Drug Scientists use all available information, in addition to that supplied in the petition.

Senator Mondale. Will you yield?

You say that in arriving at the decision that a proposed tolerance is safe, Food and Drug scientists use all of the available information in establishing that standard. Is that correct?

Dr. Ley. That is correct.

Senator Mondale. Yet later on you say in determining whether in this case grapes should be seized for the existence of poisonous pesticide residue, in effect, you disregarded all the evidence that showed pesticide poisons and accepted your own surveys which showed there is no poison.

Why would you be so selective in establishing a tolerance level, and so willing to disregard other evidence when it comes to protection of the consumers?

Dr. Ley. In pressing for regulatory action such as seizure, the agency in keeping with the usual techniques of all regulatory agencies has insisted on the use to support its action of laboratory data derived from its own laboratories or confirmed by its own laboratories if it is first called to our attention by an outside laboratory.

Senator Mondale. It is your position that you do not consider outside laboratories' tests when they are inconsistent with your own?

Dr. Ley. If, Mr. Chairman, the result of an outside laboratory such as one of those mentioned here today has results that are not confirmed in four other major FDA laboratories with extensive experience in pesticide analysis we reserve the right to operate on the basis of our own data.

Senator Mondale. In this case there were six surveys, I believe. Four of them found pesticides, two of them did not, you chose to believe the last two and ignore the first four. How do you justify that?

Dr. Ley. Mr. Chairman, we have had some considerable discussion

earlier with one of the laboratories in regard to pesticide levels in another produce, specifically, cheese. In that particular case that laboratory and we differed in our results. Our personnel visited that laboratory. In reviewing the official analytical procedure that that laboratory was allegedly using, there were deviations from the procedure in the laboratory of the outside laboratory sufficient, in our opinion, to invalidate and make incorrect the results of the analysis.

Senator MONDALE. In plain language, you don't think they are a competent source?

Dr. LEY. I did not say that, nor do I wish to imply it.

Senator MONDALE. Then why would you not give it some weight?

Dr. LEY. We have given it weight, Mr. Chairman.

Senator MONDALE. How much?

Dr. LEY. In terms of comparing that result with some 60 other analyses from our own laboratories and four separate laboratories.

Senator MONDALE. What did the England Laboratory fail to do? What tests did they fail to take which in your opinion disqualified that as a source that should be considered?

Dr. LEY. I am speaking now, for example, of the cheese.

Senator MONDALE. We are talking about grapes this morning.

Dr. LEY. I recognize that, sir. Let me then request that Mr. Burke, who visited the England laboratories and discussed the analytical procedures, come up.

This, Mr. Chairman, is Mr. Jerry Burke, of the Residue Chemistry Branch, Division of Pesticides of our Bureau of Science.

Mr. BURKE. Mr. Chairman, on the 12th of August I discussed with Dr. Windlan of the England laboratories some of the procedures he used in the analyses of the first grape samples he had received. I understand he received two samples of grapes, one of which he had reported findings of approximately 18 parts per million of aldrin. Dr. Windlan said he had personally analyzed the samples and furnished me a brief written description of the procedures he had used. He said he had used the methodology prescribed by FDA.

In examining his written notes I saw several discrepancies in the procedure for separating the pesticide residue from the coextracted sample material. And then finally his interpretation of his gas chromatographic and his paper chromatographic determinations. The procedures in residue chemistry can be followed fairly straightforwardly until you reach the point at arriving at the identity of the residue in question. Gas chromomatography provides a tentative identification for a large number of pesticide chemicals but this identification is not absolute. It must be confirmed by other tests or test. The experience of the analyst plays a great role here. I feel in the case of the England Labs, Dr. Windlan misinterpreted the data he had.

Senator MONDALE. How many years have you been testing grape pesticides?

Mr. BURKE. Mr. Chairman, I have been in the FDA method development laboratories for 40 years.

Senator MONDALE. So your experience and Dr. Windlan's are about the same number in years, maybe a few more for Dr. Windlan. Is that correct?

Mr. BURKE. That is correct.

Senator MONDALE. Did you analyze the Strasburger and Siegel test in the same way? Did you go down there and go over their testing?

Mr. BURKE. I am only aware of the one analysis.

Senator MONDALE. You went to check the credibility of the analysis which showed pesticides, but you did not go and check the one which didn't show pesticides. Is that correct?

Mr. BURKE. That is correct.

Senator MONDALE. Would there be any basis for the assumption you might be trying to discredit one test and confirm the other?

Dr. LEY. None whatsoever, Mr. Chairman, because we were unaware of the other analysis.

Senator MONDALE. The Strasburger and Siegel one?

Dr. LEY. At that time.

Senator MONDALE. Were you aware of the Eastawai Labs tests?

Dr. LEY. No, we were not.

Senator MONDALE. You may proceed.

Senator CRANSTON. May I ask a question.

In regard to the 12 samples picked up from the packers and growers that you referred to, what instructions were given to the employees that went out to pick up those samples?

Mr. KIRK. We instructed each of the districts involved to make a retail survey very quickly, don't get commercial material in warehouses and that sort of thing, but we wanted the goods as they were being marketed to the consumer. The only special instructions which we gave were to our Baltimore district to insure that they covered the Safeway store and the Giant market.

Senator CRANSTON. I am referring to the 12 samples picked up from packers and growers.

Mr. KIRK. The San Francisco one?

Senator CRANSTON. Yes.

Mr. KIRK. That was a routine survey by the district. They are required under our program to run samples from time to time on the produce of their own area to determine whether or not there are residue problems.

Senator CRANSTON. What instructions did those who went out to pick up the samples have in regard to no advance warning to those in charge that they were picking them up and the purpose of the pickup?

Mr. KIRK. Our program always calls for no advance warning.

Senator CRANSTON. When the samples are picked up, do you know that the employees do not give any choice to the packer or grower in regard to what is picked up and do not serve notice on them as to the purpose of the pickup?

Mr. KIRK. That is correct, sir. However, if we have any suspicion that a particular packer or grower may have a pesticide problem, then we would intensify our efforts on his part.

Senator CRANSTON. Thank you.

Senator MONDALE. One further question to Mr. Burke.

Would it be fair to say that while you have raised doubts about certain analysis methods by the England Laboratories, that you are

not saying that there could not have been aldrin in those grapes, is that correct?

Mr. BURKE. I can't say that there was no aldrin on the grapes but I can say that the residue, the major residue, on the grapes was not aldrin, based on the information that I was shown by Dr. Windlan.

Senator MURPHY. May I ask a question there, Mr. Chairman?

Senator MONDALE. In just a moment.

Did you analyze those grapes yourself?

Mr. BURKE. No, sir, I didn't.

Senator MONDALE. You heard Dr. Windlan testify based on his background, his experience, that there was no doubt in his mind that there was aldrin residue on those grapes in the amount that he certified? Is it your testimony that he might not know what he is talking about? Is that what you are saying?

Mr. BURKE. It is my testimony that his analysis could be in error.

Senator MONDALE. Could be in error.

Mr. BURKE. In my opinion it is.

Senator MONDALE. And that it might be in error is a judgment on your part.

Mr. BURKE. That it might be an error is a judgment on my part.

Senator MONDALE. Senator Murphy.

Senator MURPHY. I want to clarify this point. If I recall, you said you went over the notes of Dr. Windlan and that you discovered, or thought you discovered, places where he made an error in reading the results of his testing. Is that correct?

Mr. BURKE. That is correct.

Senator MURPHY. In other words, that he did all the testing properly but in his compilation of the notes in your judgment he made an error that would have led him to the results which disagree with the report of the other labs?

Mr. BURKE. I would have to clarify that a bit. Dr. Windlan said he followed the procedures in FDA's pesticide manual from which I noted several deviations. The crux of the issue is his interpretation of the gas chromatographic and paper chromatographic evidence.

Senator MURPHY. Thank you very much.

Senator MONDALE. I think we will ask Dr. Windlan, because of the serious nature of your criticism, about his testimony, in fairness to him he ought to be permitted to respond in writing to the charges that you have made.

Now, getting back to the Eastawai Labs and the Strasburger and Siegel Labs, when did you find out they had similarly prepared analyses for Safeway?

Mr. KIRK. I was advised through our CPE office that a member of your staff had learned that the Safeway Stores had had some analyses run for them at about the time of your first hearing. We had had no information on that at all, so I immediately undertook to try to find out the facts. I got in touch with Safeway.

Senator MONDALE. When was that?

Mr. KIRK. I got in touch with Safeway just before the 5th of September. On the 5th of September a Mr. Pond and a Mr. Francis from Safeway came into my office to tell me what I had inquired about. They told me of the England Laboratory results which you

just heard of this morning. They told me of the Eastawai Laboratory results. They did not have with them a report from Eastawai. They also told me of the work by Mr. Cohen, I believe it was, of Strasburger and Siegel in Baltimore.

Senator MONDALE. That was about 3 weeks ago, is that correct?

Mr. KIRK. A little more, sir.

Senator MONDALE. Did you then send FDA officials to the laboratories as you did the other?

Mr. KIRK. No, sir.

Senator MONDALE. Why did you pick the one and not the other two?

Mr. KIRK. Of course, the first flag to us when we saw that analytical report was the fact that they were reporting 18 p.p.m. of aldrin, and they showed no dieldrin whatsoever. Now that is completely at variance with our experience with aldrin applied to a raw agricultural commodity which is exposed to the elements. Normally, and we expect this, aldrin will convert gradually to dieldrin and we will find dieldrin along with aldrin when we make this kind of analysis.

Senator MONDALE. Now Eastawai found both. They found aldrin and these other properties. On the basis of that, then, did you conclude that that survey was probably in error?

Mr. KIRK. You are referring to the Eastawai?

Senator MONDALE. Right.

Mr. KIRK. I did not get the report from them.

Senator MONDALE. You were briefed on the report.

Mr. KIRK. I was told that they found generally 16 to 19 p.p.m. But keep in mind, sir——

Senator MONDALE. They also found the other properties to which you made reference. Does that convince you that that Eastawai survey is the one——

Mr. KIRK. All I know about the Eastawai survey is that I was told they found this. Frankly, in the face of all the work which the Food and Drug Administration has done on these grapes, and we have done a lot of work, we had it done in different laboratories by different chemists, all, however, using the FDA methods, and when they tell me with all that work they did not find any aldrin and our San Francisco district did not report to us a problem out there from the standpoint of pesticide residues or misuse of pesticides—and I use the term advisedly from the standpoint of putting it on too close to harvest, using too much, that sort of thing, I am not talking about the other sides of the misuse problem—I concluded that we did not have a situation where we had grapes on the market which were illegal under the Federal Food, Drug, and Cosmetic Act.

Senator MONDALE. Let me be sure I understand your testimony. The farmworkers took an independent sample to the England Laboratories. The results came up with a heavy concentration of aldrin.

Dr. LEY. Alone.

Senator MONDALE. Then Safeway, selecting their own laboratory, went twice to the England Laboratories, and both times they came back with high concentrations of aldrin. They also selected a laboratory of their own choosing, Eastawai Laboratories, which came back with high concentrations of aldrin. They went to a third

laboratory, Strasburger and Siegle, which didn't show any aldrin residues.

Mr. KIRK. That is right.

Senator MONDALE. On the basis of that survey and your other surveys you decided to disregard completely the first-four surveys that showed aldrin, is that correct?

Mr. KIRK. Keep in mind that after the first report of the 18 p.p.m., we had Mr. Burke go to this laboratory. As a matter of fact, I arranged for that trip because I wanted to find out whether there was anything wrong. Actually, if such a report had come into one of our districts I would have had the sample checked in another laboratory because I would have asked, where is the dieldrin, what is wrong, is somebody reading kelthane instead of aldrin.

Senator MONDALE. Why didn't you check the Eastawai test? I don't understand.

Mr. KIRK. I didn't have any question but what our results were right. These were all from the same lots, remember.

Senator MONDALE. That is the answer I wanted to hear. That is what I was afraid of. We do not know whether all grapes checked were from the same lot.

Dr. LEY. Mr. Chairman, may I add one further comment. However, in cross-checking between two different laboratories one of the basic principles of such validation is that both laboratories analyze the same specimen. We will be pleased to do check analysis on the same specimen with any one of these laboratories. There is no question about this. But I point out that in view of the diversity of results from the four laboratories involved in the Safeway analysis that we chose to utilize our own laboratory workers and our own laboratory capabilities to resolve the question. It is this type of information obtained by people who have had long experience in pesticide analysis that we must use to substantiate any legal action which we take.

Senator MONDALE. Proceed.

Dr. LEY. In general, a petition for a tolerance for a pesticide is required to contain certain basic information:

1. It must contain information showing the identity, composition, chemical name, and common name.

2. It must set forth the conditions of use including directions, limitations, and restrictions.

3. Methods of analyses must be described including validation studies, accuracy checks and applicabiility to the total toxic residue. The methods must be practical for regulartory control use.

4. The petition must contain residue data reflecting the most strenuous conditions of use (maximum dosage and number of applications), the major geographical production areas and in certain cases data on the processed food.

5. It must contain acute, subacute and chronic toxicity studies in animals, covering different species, different dosages, and different spans of time. The extent and complexity of these studies will depend on the type of compounds involved and the magnitude of residue on edible crops.

6. Reproduction tests spanning two or three generations and

three different dosage levels are required in setting tolerances on all but "negligible residues" of pesticides.

Pesticide tolerances are set forth in the Code of Federal Regulations, Title 21, Part 120.

It is thus obvious that the requirements for setting a tolerance for a pesticide are most stringent. These data requirements are subject to continued review by FDA. New scientific data and advances in the evaluation of safety data are considered. Data requirements are changed when indicated. Tolerance setting is not a static process.

New pesticide chemicals, formulations, and other methods of insect control are constantly being developed. New tolerances are required and existing tolerances must be reviewed in terms of current good agricultural practice and need in keeping with the policy that residue tolerances should not be higher than what result from the amount of pesticide necessary for safe and effective use.

For example, FDA has recently published an order to reduce DDT tolerances. This action was initiated by a finding that good agricultural practices would permit lower tolerances; in fact, analysis of a large number of samples over the past several years showed that the level of DDT found on most fruits and vegetables is far below the 7-ppm tolerance for that pesticide. Residue tolerances of aldrin, dieldrin, captan, folpet, and TDE also have been reduced recently.

If the review of the petition and all other available data shows that the requested or proposed tolerance for a residue is safe, then the tolerance is established by promulgation of a regulation. It should be emphasized that the tolerance is set at the lowest level resulting from that use of the pesticide which will accomplish the intended effect, even though a larger amount of the residue may have been shown to be safe to the consumer as gauged by the animal feeding studies. There must be a substantial margin of safety between the largest amount of the residue that produces no effect in the test animals and the amount which may remain on the food crop.

Obviously the establishment of safe residue tolerances does not, in itself, protect the consumer. Effort must be expended to enforce the tolerances to ensure that the regulations are being followed. FDA has for many years carried out an active program in this area of consumer protection.

Our inspectors visit growers, county agriculture agents, pesticide dealers, packing sheds, and pesticide applicators. They are alert for any indication of pesticide misuse. They collect samples of crops, both pre- and post-harvest, for laboratory analysis.

A number of States also are active in policing both pesticide usage and residues on crops. We exchange information with these State officials so that all possible steps can be promptly taken to remedy any situation where over tolerance residues are found.

Any food product which is, or has been, in interstate commerce and which is found to contain an illegal residue is subject to seizure and condemnation. The persons responsible for shipping such food are also subject to criminal prosecution.

In our surveillance and control activities, during the period from July 1, 1968 to June 30, 1969, we examined 12,398 samples of foodstuffs, both domestic and import, for pesticides. More than half of the samples did contain residues of pesticide chemicals, the majortiy of these residues were well below tolerance levels. However, 27 shipments were seized in domestic commerce and 135 import shipments were detained at the port of entry, because of illegal residues.

In addition to these surveillance activities, we also conduct "market basket" or total diet studies. These can be characterized as the final check on the tolerance system.

In these studies, samples of a variety of foods are purchased at retail stores in five different regions over the country. The proportion of individual food items used in these studies was developed by the U.S. Department of Agriculture and is based on the diet of a 16 to 19-year-old male, the biggest eater in the entire population.

The quantity of this diet is approximately double that of the average individual, as I am sure parents of teenagers will attest. The samples of food are prepared as for consumption and then analyzed for pesticide residues.

Throughout the 4 years of this study, the dietary intake of pesticide chemicals has been below the acceptable daily intake established by the FAO/WHO Expert Committees, and below those intake levels anticipated by our scientists when considering proposals for tolerances.

FDA is also engaged in continuing research in developing better analytical methodology for pesticides. As we stated earlier, when a new chemical is introduced, a specific method for its detection is required. This single specific method may be adequate to determine the amount of that chemiical on a given food at a given time after application, but we are often not in a position to know which of the many chemicals may have been used on a food crop.

Therefore, we do not know what specific method to apply. The problem is further compounded by actions which may convert the original chemical to other compounds after application. As an example, aldrin starts converting to dieldrin shortly after application.

Sometimes these altered compounds are more important from a toxicity viewpoint than the original chemical. Our chemists, therefore, need methods to measure any of these chemicals present.

Our research efforts have been thus directed toward the multi-residue methods or those which measure many different chemicals simultaneously. This is the method that you have already heard discussed today.

In this multiresidue methodology, FDA chemists have been leaders. The ideal method would be a universal one which would detect and measure all of the original pesticide chemicals and all the significant alteration products which may have formed. The scientists have not, of course, achieved thiis ideal, but they have made considerable progress.

Contrary to a popular misconception, gas liquid chromatography

is not a simple operation where the sample is placed in a machine by a technician and the answer comes out in a ready-to-use form.

Using the gas liquid chromatography, multiresidue methodology, a chemist with proper training, experience and equipment can analyze a sample of any of a large variety of foods and simultaneously obtain a high degree of accuracy in identifying about 60 different residue chemicals and measuring them quantitatively, all in the span of several hours. The information from the gas liquid chromatography equipment does not automatically identify the pesticide residue.

It is essential that this data be evaluated by an experienced and competent analyst to establish a tentative identification so he can deermine what further tests are necessary to confirm the identity. The method produces reliable results. There are many parameters, which must be fully understood and well controlled, otherwise the results can be misleading or misinterpreted.

Senator MONDALE. Will you yield for a minute?

Dr. LEY. Certainly.

Senator MONDALE. I assume these last few paragraphs have been directed at the inconsistency between your results and those of the others that show pesticides residues. Is it your judgment here that there couldn't have been aldrin on the grapes tested three times by the England Laboratories? Is that your testimony?

Dr. LEY. I can only accept the word of the best expert we have here in Washington on this technology.

Senator MONDALE. As I recall, he said it was his judgment that there wasn't, but he doesn't know. His testimony goes to the testing methods as he saw them.

Now let us go to the next point. Is it your judgment that the Eastawai tests which showed aldrin residues are similarly to be rejected?

Dr. LEY. In the view of the consistent finding from four separate FDA laboratories, each one of which has spent a very large part of its time in pesticide analysis, I would question, subject to further review, the results from Eastawai.

Senator MONDALE. That is based on the fact that your people said one thing and his survey said another. There has been no check on the Eastawai Laboratories to determine whether or not it was handled according to your version of what should be done, is that correct?

Dr. LEY. That is correct.

Senator MONDALE. In light of the fact that Eastawai's tests, a reputable laboratory, showed these high residues far in excess of your tolerance level, why didn't you check and determine if it was from the same sample, whether there was a mistake, or whether in fact there were dangerous levels of aldrin? I don't quite understand how you finally disregarded the Eastawai test.

Dr. LEY. Mr. Kirk dealt with most of this work in coordination in the field. I prefer he answer that question.

Mr. KIRK. We were talking, sir, about the Eastawai which, by the way, I never saw a report on until this morning.

Senator MONDALE. You were briefed on it.

Mr. KIRK. I was given a figure that they had a total of so much aldrin.

Senator MONDALE. Did you ask for the report when you were told about it?

Mr. KIRK. No.

Senator MONDALE. Weren't you interested?

Mr. KIRK. Not at that stage.

Senator MONDALE. At what stage do you get concerned about evidence of poisonous residues on food?

Mr. KIRK. I am always concerned.

Senator MONDALE. Then why didn't you ask for a copy of the report?

Mr. KIRK. They had given me the figures that the man said he found. Let me say, sir, that we had run a survey of all of these samples including grapes from the same area, grapes from the same packers. We had information from our west coast office.

Senator MONDALE. We have been all through that. I am trying to find out why you reject the Eastawai Laboratories as not even worthy of checking, as you did with——

Mr. KIRK. I had already asked Mr. Burke to go to the England Laboratory. His report to me was that he did not believe that the England Laboratory report——

Senator MONDALE. We are talking about Eastawai?

Mr. KIRK. Yes

Senator MONDALE. Why didn't you go to Eastawai?

Mr. KIRK. Those are two things. Then we had the Strasburger and Siegel report which said they didn't find it. I was not surprised because it confirmed ours, a laboratory I have known of for 30 years in this business.

Senator MONDALE. Why didn't you send somebody to Eastawai Laboratory to determine whether thy knew what they were talking about?

Mr. KIRK. I didn't think it was worth while to take the time.

Senator MURPHY. Is it your business to test laboratories or to test food?

Dr. LEY. To test foods.

Senator MONDALE. I didn't get the subtle distinction there.

Senator CRANSTON. Going back to your testimony on the preceding page, you said, "The samples of food are prepared as for consumption and analyzed for pesticide residue." What do you mean by samples of food prepared for consumption?

Dr. LEY. This would mean that if the food is normally washed before cooking they would be treated exactly as though they were in a housewife's kitchen. In many cases some of the residue on the product will be poured off or discarded in the washing of the product.

Senator CRANSTON. Before you conducted your test on the grapes, you washed them?

Dr. LEY. No. This is the total diet studies only, Senator Cranston, and it is quite a different subject from the 60 samples which I earlier mentioned. Those samples are not prewashed or treated before analysis.

Senator CRANSTON. On the tests you have been talking about here, did you wash them prior to the testing?

Dr. LEY. In none of the 60 was there treatment or washing applied to the grape samples. The restrictions here in terms of the total diet study I think are obvious. We are trying to get a measure of the amount of pesticide actually consumed by the families eating these foods.

Senator CRANSTON. When you go about doing that in those cases how do you determine how thoroughly the average housewife is going to wash them? What procedures do you follow in doing the washing?

Dr. LEY. This is a very difficult item to standardize in any way. Some housewives will wash vigorously and others will just dunk.

Senator CRANSTON. How do you wash them?

Dr. LEY. I think that the best answer here is that we use a moderate approach, a dunking. We don't try to scrape the entire skin off the vegetable or fruit.

Senator MONDALE. Proceed.

Dr. LEY. Mr. Chairman, you asked about FDA's actions after learning about some tests on grapes conducted for Safeway Stores.

The information that such tests had been conducted came to us from a member of your staff and we investigated. We were informed by representatives of Safeway, early in September, that they had some samples analyzed following the August 1 hearing. We were informed verbally of the reported results of the analyses and were furnished, by Safeway, with a copy of two reports from the C. W. England Laboratory, Washington, D.C., identified as the results on grape samples submitted by Safeway to that laboratory.

There was a wide range in the findings on the various samples as given to us by the Safeway representatives. The range was from one laboratory reporting "no aldrin or dieldrin, 0.11 p.p.m. DDT and a trace of some identity nondetermined pesticides," to another laboratory reporting 16.8 to 19.1 p.p.m. aldrin and dieldrin residue.

These varied results were reportedly obtained on grapes from the same lots in possession of Safeway. We, of course, cannot vouch for the accuracy of any of these reports. FDA has found no samples of grapes which bore residues confirmatory of the aldrin-dieldrin findings of the commercial laboratories mentioned.

We had no information until this morning about Safeway canceling orders on table grapes because of finding high levels of pesticides.

We have, as previously stated, continued our surveillance program of examining samples of various raw agriculture products, including grapes. To date, we have not encountered any residues in grapes which exceed the established safe tolerances.

In 334 samples of grapes, FDA has examined in the past 2¾ fiscal years, no illegal residues of aldrin have been reported, nor were any found in the surveys mentioned earlier. If we should find grapes or any other food containing an unsafe pesticide residue, we would take the appropriate steps to remove that product from the channels of consumer commerce.

(Exhibits A and B accompanying the prepared statement follow:)

EXHIBIT A

SURVEY ON GRAPES

Resiudes Found Parts Per Million

Sample # And Date Collected	Grower or Packer	Kel-thane	DDT	DDE	Diel-drin	Dia-zinon	Ethion	Tedion
1. Chicago District - Retail Markets								
116-470C 8-6-69	El Rancho Farms, Arvin, Cal.	T*	-	-	-	-	-	-
116-471C 8-6-69	El Rancho Farms, Arvin, Cal.	T	T	T	-	-	-	-
117-216C 8-6-69	Unkown	0.11	T	T	-	-	-	-
117-217C 8-6-69	Table of Grapes, Table of Grapes, Cal.	T	-	-	T	T	0.08	-
117-949C 8-6-69	El Rancho Farms, Arvin, Cal.	0.17	-	-	-	-	-	-
117-950C 8-6-69	El Rancho Farms, Arvin, Cal.	0.66	-	-	-	-	-	-
118-093C 8-4-69	El Rancho Farms, Arvin, Cal.	0.86	-	-	-	-	-	-
118-094C 8-4-69	El Rancho Farms, Arvin, Cal.	0.17	-	-	-	-	-	-
118-095C 8-6-69	Giumarra Vineyards Corp. Bakersfield, Cal.	-	T	T	-	T	-	-
118-096C 8-6-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.31	-	-	-	-	-	-
118-164C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	T	-	-	-	-	-	-
118-165C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	T	-	-	-	-	-	-

T* Trace, Indicates Less Than 0.01 PPM

Sample # And Date Collected	Grower or Packer	Residues Found Parts Per Million: Kelthane	DDT	DDE	Dieldrin	Diazinon	Ethion	Tedion
2. New York District - Retail Markets								
196-569C 8-5-69	The William Mosesian Corp. Lamont, Cal.	0.15	-	-	-	-	-	-
196-570C 8-5-69	John J. Kovacevich, Inc. Arvin, Cal.	-	-	-	-	-	-	-
222-182C 8-4-69	John J. Kovacevich, Ind. Arvin, Cal.	0.09	-	-	-	-	-	-
222-183C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.08	-	-	-	-	-	-
222-184C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.05	-	-	-	-	-	-
222-185C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.19	-	-	-	-	-	-
222-186C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.07	-	-	-	-	-	-
222-187C 8-5-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.03	-	-	-	-	-	-
222-188C 8-5-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.17	-	-	-	-	-	-
222-189C 8-5-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.04	-	-	-	-	-	-
222-190C 8-5-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.12	-	-	-	-	-	-
222-191C 8-5-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.04	-	-	-	-	-	-

Sample # And Date Collected	Grower and Packer	Residues Found Parts Per Million: Kelthane	DDT	DDE	Dieldrin	Diazinon	Ethion	Tedion
3. Los Angeles District - Retail Markets								
165-728C 8-1-69	Leo Gagosian Bakersfield, Cal.	-	-	-	-	-	-	-
165-729C 8-1-69	Guedera Farms Bakersfield, Cal.	-	T	-	-	-	-	-
165-730C 8-1-69	Giumarra Vineyards, Corp. Bakersfield, Cal.	0.52	-	-	-	-	-	-
166-761C 8-1-69	The William Mosesian Corp. Lamont, Cal.	0.78	0.02	-	-	-	0.13	-
166-762C 8-1-69	Sabovich Bros. Bakersfield, Cal.	0.89	-	-	-	-	-	-
166-763C 8-1-69	I.T.O. Packing Co. Reedley, Cal.	-	-	-	-	-	-	-
166-764C 8-1-69	Leo Gagosian Bakersfield, Cal.	0.74	T	-	-	-	-	-
166-765C 8-1-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.26	-	-	-	-	-	-
166-766C 8-4-69	J. W. Heldcorn Parlier, Cal.	0.11	0.03	-	-	-	-	-
166-767C 8-4-69	Demesio C. Carranza Thermal, Cal.	-	-	-	-	-	-	-
168-027C 8-1-69	Muzinch Farms Wheeler Ridge, Cal.	1.4	0.29	-	-	-	-	-
168-028C 8-1-69	Elmo Vineyards, Inc. Visalia, Cal.	-	-	-	-	-	0.23	-

T Trace, Indicates Less Than 0.01 PPM

Sample # And Date Collected	Grower or Packer	Residues Found Parts Per Million: Kelthane	DDT	DDE	Dieldrin	Diazinon	Ethion	Tedion
4. Baltimore District - Retail Markets								
095-121C 8-1-69	The William Mosesian Corp. Lamont, Cal.	0.61	-	-	-	-	0.08	-
		Giant Food Store, 4900 Annapolis Road, Bladensburg, Maryland						
095-122C 8-4-69	James Macchiaroli Fruit Co. Higley, Arizona	-	T	0.01	-	-	-	-
095-123C 8-4-69	James Macchiaroli Fruit Co. Higley, Arizona	-	T	T	-	-	-	-
095-796C 8-4-69	Bianco Fruit Corp. Fresno, Cal.	0.24	-	T	-	-	-	-
095-797C 8-4-69	David Freedman & Co., Inc. Thermal, Cal.	-	T	T	-	-	-	-
095-798C 8-4-69	Bianco Fruit Corp. Fresno, Cal.	0.46	T	0.01	-	-	-	-
095-799C 8-4-69	David Freedman & Co., Inc. Thermal, Cal.	-	T	T	-	-	-	-
095-989C 8-4-69	James Macchiaroli Fruit Co. Higley, Arizona	-	T	T	-	-	-	-
095-990C 8-4-69	James Macchiaroli Fruit Co. Higley, Arizona	-	-	-	-	-	-	-
095-991C 8-5-69	The William Mosesian Corp. Lamont, Cal.	0.20	T	T	-	-	-	-
095-992C 8-5-69	Heggblade, Margulers Co. San Francisco, Cal.	1.33	-	-	-	-	0.29	-
096-080C 8-1-69	Bianco Fruit Corp. Fresno, Cal.	0.35	T	T	-	-	-	-
		Safeway Store, 1730 Hamlin Street, N. E. Washington, D. C.						

T Trace, Indicates Less Than 0.01 PPM

Sample # And Date Collected	Grower or Packer	Residues Found Parts Per Million: Kelthane	DDT	DDE	Dieldrin	Diazinon	Ethion	Tedion
5. San Francisco District - Packer Level								
INV 211-644C 8-4-69	Russo Brothers, Arvin, Cal.	0.13	-	-	-	-	-	-
INV 211-645C 8-4-69	Logrecco & Sons Bakersfield, Cal.	0.40	0.03	0.01	-	-	-	0.18
INV 211-646C 8-4-69	Marko Zaninovich Earlimart, Cal.	-	-	-	-	-	-	-
INV 211-647C 8-4-69	Marko Zaninovich Earlimart, Cal.	0.17	-	-	-	-	-	-
INV 211-648C 8-4-69	Pagliarulo Fruit Co. Delano, Cal.	0.02	-	-	-	-	-	-
INV 211-649C 8-4-69	Pagliarulo Fruit Co. Delano, Cal.	0.01	-	-	-	-	-	0.01
INV 211-650C 8-4-69	A. Caratan & Sons Delano, Cal.	-	-	-	-	-	0.08	0.44
INV 211-651C 8-4-69	A. Caratan & Sons Delano, Cal.	-	-	-	-	-	0.28	1.7
INV 211-652C 8-4-69	Agri-Business Investment Co., Ducor, Cal.	-	-	-	-	-	-	0.02
INV 211-653C 8-4-69	Agri-Business Investment Co., Ducor, Cal.	0.15	-	-	-	-	-	-
INV 211-654C 8-5-69	United Packing Co Parlier, Cal.	-	-	-	-	-	-	-
INV 211-655C 8-5-69	L. R. Hamilton Reedley, Cal.	0.43	0.04	0.02	-	0.02	-	-

Sample # And Date Collected	Shipper	Residues Found - Parts Per Million						
		Kelthane	DDT	DDE	Dieldrin	Diazinon	Ethion	Tedion
6. Chicago District - Produce Houses								
118-061C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	T	-	-	-	-	-	-
118-062C 8-4-69	Paramount Citrus Assn. San Fernando, Cal.	T	-	-	-	-	-	0.17
118-063C 8-4-69	El Rancho Farms Arvin, Cal.	0.24	-	-	-	-	-	-
118-064C 8-4-69	Paramount Citrus Assn. San Fernando, Cal.	T	-	-	-	-	-	0.10
118-065C 8-4-69	Paramount Citrus Assn. San Fernando, Cal.	-	T	-	-	-	0.12	0.18
118-066C 8-4-69	Giumarra Vineyards Corp. Bakersfield, Cal.	0.26	T	T	-	-	-	0.11
118-501C 8-4-69	Logrecco Bros. Arvin, Cal.	T	T	T	-	-	-	0.50
118-502C 8-4-69	Logrecco Bros. Arvin, Cal.	0.48	-	-	-	-	-	-
118-503C 8-4-69	Giumarra Vineyard Corp. Bakersfield, Cal.	0.15	0.04	T	-	-	-	-
118-504C 8-4-69	El Rancho Farms Arvin, Cal.	0.39	T	T	-	-	-	-
118-505C 8-4-69	ITO Packing Co. Reedley, Cal.	-	-	-	-	-	T	-
118-506C 8-4-69	Sabovich Bros. Bakersfield, Cal.	0.23	-	-	-	-	-	-

T=less than 0.01

Sample # And Date Collected	Grower/Packer	Residues Found - Parts Per Million						
		Kelthane	DDT	DDE	Dieldrin	Diazinon	Ethion	Tedion
7. Los Angeles District - Grower/Packer Level								
168-029C 8-4-29	Richard Bagdasarian, Inc. Mecca, Cal.	-	-	-	-	-	-	-
168-030C 8-4-69	Double V Ranch Mecca, Cal.	-	-	-	-	-	-	-
168-031C 8-4-69	William K. Young Ranch Mecca, Cal.	-	-	-	-	-	-	-

Tolerances: on grapes

Kelthane	5.0 ppm
DDT	7.0 ppm
DDE	None (metabolite of DDT)
Dieldrin	0.1 ppm
Diazinon	0.75 ppm
Ethion	2.0 ppm
Tedion	5.0 ppm

EXHIBIT B

San Francisco District Surveillance of Pesticides on Grapes

Sample # and Date Collected	Grower or Shipper	Parts Per Million Residues Found
Inv. 211-629C 8/7/69	Morris Fruit Fresno, California Fresno County	Kelthane 0.28
Inv. 211-631C 8/11/69	Giumarra Vineyards Bakersfield, California Kern County	DDT 0.13 DDE 0.02 Kelthane 0.25
Inv. 211-639C 8/20/69	W. C. Hanson Exeter, California Tulare County	None
Inv. 210-461C 8/26/69	L. Sarti Farms Lodi, Calif. San Joaquin County	None
Inv. 210-462C 8/26/69	Reynolds Neiling Lodi, Calif. San Joaquin County	None
Inv. 210-463C 8/26/69	Graffigna Fruit Co. Lodi, Calif. San Joaquin County	None
Inv. 211-605C 8/27/69	W. C. Hanson Exeter, California Tulare County	None
Inv. 211-606C 9/3/69	Tom Buratovich Dinuba, California Tulare County	None
Inv. 211-761C 9/9/69	L. R. Hamilton Reedley, Calif. Fresno County	None
Inv. 211-762C 9/9/69	Tom Buratovich Dinuba, California Tulare County	None
Inv. 211-763C 9/10/69	Nash-DeCamp Exeter, Calif. Tulare County	None
Inv. 212-167C 9/16/69	Ballantine Produce Co. Sanger, Calif. Fresno County	Ethion-0.06

Established Tolerances for pesticides found

Ethion - 2.0 ppm
Kelthane - 5.0 ppm
DDT - 7.0 ppm
DDE - None (Metabolite of DDT)

Dr. LEY. Many people in the area of Michigan and Illinois are well aware of other actions we have taken within the past year to remove food from interstate commerce which contained excessive amounts of residue.

Senator CRANSTON. What procedures do you take when you find illegal residues on products?

Dr. LEY. Senator Cranston, assuming these foods have moved in interstate commerce, which is essential for us to exercise our authority, we would then move to seize the product. We might not have to seize the product because in many cases the grower or producer or distributor will move to voluntarily remove that product from the market and destroy it. In the cases where we have a contest, we must take action to seize. Seizure may be contested. The nature of the data supporting our seizure is of course critical to the success or failure of our case.

Senator CRANSTON. Do you take criminal actions against those responsible for putting them on the market if they have violated the law?

Dr. LEY. It depends on the facts, Senator Cranston. Obviously if there are repeated violations by a particular individual or firm we may move strongly to place that individual or firm under additional penalty. In many cases the high residues may have resulted from, as nearly as we can tell, and it happened only once, a misapplication of the pesticide. We would not be inclined under those circumstances to take criminal action against the grower or producer.

Senator CRANSTON. How many violations do you normally accept from a particular source before you take criminal action?

Dr. LEY. Against the individual? Mr. Kirk, you have a better feel than I do about it.

Mr. KIRK. It would not be a question of numbers. As Dr. Ley says, an isolated case where you have no reason to believe that there was a deliberate undertaking to misuse the pesticide, you would not recommend a criminal action. But, you could have a situation where it repeats and particularly if after the first one, you have demonstrated why and the man just kept on doing it, you would feel a responsibility for referring this to the Department of Justice for criminal action. It is not a numbers situation, however. As I say, if it were a real deliberate operation, one would be too many.

Senator CRANSTON. You refer to 27 shipments being seized in domestic commerce. Was any criminal action taken in any one of those cases?

Mr. KIRK. There were two criminal actions during the year. I didn't make a notation of what they were, whether they were the result of seizures or not.

Senator CRANSTON. You don't know whether criminal action was taken in regard to any one of those 27?

Mr. KIRK. Not specifically, but we did take one criminal action in 1 year and one in another.

Senator CRANSTON. In relation to what products were those actions taken?

Mr. KIRK. One was a lettuce case, that I recall. I don't remember the other one. I can get that for the record if you like.

Senator CRANSTON. I wish you would.

(The information follows:)

ATTACHMENT A
CRIMINAL ACTIONS INVOLVING PESTICIDES

Fiscal year 1969

Product: Cabbage.
Defendant: Jones K. Andrews, Sparta, North Carolina.
Pesticide and quantity found: Toxaphene—17.6 to 40.1 ppm*.
Legal tolerance: 7 ppm.

1. Defendant charged in 4 counts with introducing into interstate commerce, 4 different shipments of a raw agricultural product (cabbage) bearing a pesticide chemical which was in excess of the established tolerance.
2. Defendant pleaded guilty to 4 counts.
3. Defendant fined $1,000, on each of the counts with payment of $3,000 suspended for two years upon payment of the other $1,000 and upon conditions that defendant complies with the Food, Drug, and Cosmetic Act and Regulations.
4. There were no seizures of the products involved in this prosecution. Two of the shipments were distributed before the analyses were completed. The other two shipments were embargoed and destroyd under the supervision of State authorities.

Fiscal year 1968

Product: Lettuce.
Defendant: Western Growers Distrs., Inc., Glendale, Arizona.
Pesticide and quantity found: Toxaphene—14.6 to 40.0 ppm; Parathion—1.08 to 3.1 ppm.
Legal tolerance: 7 ppm and 1 ppm.

1. Defendant charged in 3 counts with introducing into interstate commerce 3 different shipments of a raw agricultural product (lettuce) bearing pesticide chemicals in excess of established tolerances.
2. Defendant pleaded "not guilty" to the charges on 6-17-68 but changed the plea to "nolo contendere" on one count on 6-9-69.
3. Defendant fined $300 on the one count and the other two counts were dismissed by the Court.
4. Seizure was made on 1150 cartons of the lettuce shipped as charged in count I and on 953 cartons shipped as charged in count III. The lettuce involved in Count II had been distributed by the time the analysis was completed.

Senator MONDALE. A good deal of our time this morning has been consumed on the conflicting laboratory reports. The broader issue before this committee, however, is the health and safety of the workers, the farmworkers who deal with these pesticides. A month and a half ago, when we had HEW officials testimony here, your statistician testified that in his opinion at least as many as 800 people a year may die from pesticides. He further estimated that at least as many as 80 a year may be seriously injured.

This morning Mr. Chavez testified that through innumerable specific examples that came from the Department of Health in the State of California, from surveys which doctors in and around Delano developed, and from the union's experience from what they have seen, it is well established that pesticides are a dangerous risk to the health of workers in the field. This is a risk far more than

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* ppm = parts per million

I think the U.S. Government has known, and I think far more also than the Senate and the Congress have known.

We have, therefore, a rather widespread pattern in which farmworkers are exposed to the use of pesticides, sometimes negligently, sometimes inadvertently, perhaps on occasion I assume rather deliberately, which may take their lives, which may seriously affect their health, and which may cause long periods of illness.

What powers are being exercised at the Federal level to protect farmworkers as human beings against this problem? Bear in mind that Mr. Chavez testified that he could never recall a Federal official ever being seen participating in any efforts in and around Southern California, where his workers are, concerned in any way with protecting farmworkers.

I recall this issue came up at the last hearing and there seems to be some uncertainty. Perhaps you can enlighten us.

Dr. LEY. Mr. Chairman, the major issue as I have listened to the testimony this morning is an issue of occupational health of farm workers in this country.

Senator MONDALE. That is correct.

Dr. LEY. The Department of Health, Education, and Welfare has at this time no real authority in this field. Specifically, we in FDA are not involved in this particular area. However, there is pending before the Congress at this time the occupational safety and health bill which would cover farmworkers.

I have been informed that hearings have been completed in the House and they are scheduled in the Senate.

Senator MONDALE. Would you say at this point, then, that the Public Health Service, Department of HEW, has no meaningful involvement in the protection of farmworkers from pesticide poisoning?

Dr. LEY. We are concerned, but we have no real authority at this time to become involved.

Senator MONDALE. To the extent that you are concerned, it is rather academic. There is nothing you can do about it?

Dr. LEY. We do many additional data collecting activities within the Department.

Senator MONDALE. And that has been helpful. We have heard from your statistician. But even there he said that the data collecting methods were wholly inadequate and it was only in a few small surveys that he has been able to take on the spot checks that permitted him to even develop the figures he had. He said that he assumed that most injuries or deaths were not reported.

Dr. LEY. This I agree, Mr. Chairman, is the case. We do not have a compulsory reporting system for this type of injury as we do for infectious disease. So that our reports are only a sample of what actually exists.

Now in addition to the major issue this morning, that of occupational exposure to pesticides, I would like to remind the committee that I think there are two other major areas in which pesticide injury may also occur. Accidental poisoning particularly from discarding improperly the containers used to transport pesticides, and lastly, those cases where pesticides may be used for

intentional purposes, that is, suicide. We do become involved somewhat in the accidental poisoning area when a pesticide container may contaminate food in transit. We move vigorously to remove that contaminated food from the market.

Senator MONDALE. Suppose you find, for example, that a pesticide is being used in a way that endangers the lives and health of farmworkers. Is it your testimony this morning that there is nothing you can do with that information?

Dr. LEY. Legally, as far as we in FDA are concerned, I do not believe there are any steps that we can take directly. Mr. Kirk reminds me that we do have one step which we can take and have taken where we find repeated reports of a type of injury which could be prevented by better instructions to the user of pesticides on the label of the container we can recommend that labeling be changed to reflect the health hazard we have identified.

Senator MONDALE. Would you say at this point the available Federal legislation and local legislation is substantially adequate to protect the farmworker from pesticide poisoning by exposure?

Dr. LEY. I would much prefer to present for the record the statements of Dr. Egeberg, Assistant Secretary for Health and Scientific Affairs, and Mr. Charles C. Johnson, Administrator, Consumer Protection and Environments' Health Services, in testifying on H.R. 13373. I believe these statements set forth the Department's views best.

Senator MONDALE. We would appreciate having them, and we will put them in the record, but what is your opinion? We have a lot of reports to read. What do you think? Do you think it is adequate?

(The prepared statements referred to above follow:)

PREPARED STATEMENT OF ROGER O. EGEBERG, M.D., ASSISTANT SECRETARY FOR HEALTH AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, BEFORE THE SELECT SUBCOMMITTEE ON EDUCATION AND LABOR, U.S. HOUSE OF REPRESENTATIVES, SEPTEMBER 18, 1969

Mr. Chairman and members of the Subcommittee, I welcome this opportunity to testify in support of H.R. 13373, "The Occupational Safety and Health Act of 1969." This important and necessary legislation has the wholehearted support of the Department of Health, Education, and Welfare for a number of reasons which I should like to discuss briefly.

May I say that while I am still rather new to my duties as Assistant Secretary for Health—and I am rapidly learning just how extensive and challenging those duties are—I am no stranger to the broad complex field of occupational health. A good part of my professional career, both in research and in directing programs of health care and training, has brought me into very close contact with the health and safety hazards of workers. Right up until last year, I had a continuing and I think productive interest in the origins, effects, and control of a fungus disease that affect agricultural workers throughout the Southwestern States and elsewhere in the world.

This is a disease that usually begins in the respiratory system, but that can and sometimes does spread throughout the body. If that happens, about half of the patients will die of the disease—it is called cocioidomycosis. Fortunately death is comparatively rare, and the occurrence of this particular occupational disease is declining. It nevertheless remains an important health problem in the Southwestern United States.

But even more compelling evidence of the needless tragedy of occupational injury and death was brought home to me through my experience as Medical Director of the Los Angeles County Hospital. You cannot be involved in run-

ning a large, public hospital in a major metropolitan area without seeing, almost on a daily basis, the stark, cruel evidence of our failure to come to grips with the health and safety hazards that threaten millions of American workers.

Maimed and broken bodies, poisoned lungs and kidneys, workers burned, blinded, or gravely injured in some other way—these are among the regular daily fare of hospitals in every part of the country.

I don't want to dwell on unpleasant details. You know them as well as I, though we may have learned about them in different ways.

We are experiencing a continuing national tragedy of occupational injury, disease, and death. The scope of this tragedy, the number of its victims, we can only guess at, and acknowledge that our guess is probably low. There are an estimated 14,000 work-related deaths each year, but I cannot help thinking that if we really had the power to see how many people are killed each year because of the work they do—those whose deaths are mistakenly assigned to some other cause—we would come up with a much larger figure, how much larger I frankly don't know. I wish I did, because if we could really tabulate the full extent of death, illness, and injury caused by the exercise of the right to earn a living, I think all of us would be appalled.

Appalled and ashamed, and resolved as a nation to do whatever is within our power to put an end to the needless price in human suffering, not to mention economic waste, that society pays for occupational hazards.

Mr. Chairman, the Occupational Safety and Health Act of 1969 represents an enlightened and urgently needed step toward control of the occupational health and safety spectre that is abroad in this land. Enactment of this legislation would provide the tools without which little real progress can be made toward improving occupational health and safety conditions in this country.

Its major tool, the establishment and enforcement of standards, is essential to progress in this field. Until meaningful standards are adopted with the force of law, I fear we cannot look for the kind and extent of health and safety protection that the American people have every right to demand.

Let me just say at this point that all of us are aware of the very significant strides toward improved working conditions that have been made by many segments of industry, by agencies of government at the Federal, State, and local levels, by organized labor, and by many others who are deeply committed to the control of occupational hazards. This is by no means a barren field of endeavor; it is a very fertile one, and I think it is highly important that the Administration Bill now before this committee proposes to build on what has been accomplished rather than to undercut important work that has been going on for decades.

Moreover, the Bill recognizes that setting and enforcing standards, no matter how appropriate and sound they may be, will not by itself solve this country's problems in occupational health and safety. We badly need better and more complete knowledge of occupational hazards, particularly of those insidious hazards whose effects may not be observable for many years. We need a continuing flow of knowledge as the basis for standard-changing, for we cannot assume that any health or safety standard can ever be good for all time.

Furthermore, it will take a great many more people to launch a meaningful attack on the problems of occupational safety and health. These people, particularly at the State and local level, will have to be trained, and the Administration Bill would make it possible for the Department of Labor and the Department of Health, Education, and Welfare to support that training.

I think it is unnecessary for me to itemize the provisions of H.R. 13373. The important thing is that they constitute a very sound marriage of the responsibilities and capabilities of the two Federal Departments most directly concerned, the new National Occupational Safety and Health Board that would be established under the law, the State agencies whose role would be greatly strengthened by enactment of the Bill, and the private sector whose contribution to this field would be recognized and encouraged, as indeed it must be.

Let me conclude by saying this: The Department to which I have lately come, and primarily the Public Health Service, has long endeavored to improve the status of occupational health in this country. Our efforts have been modest, but productive. We look forward to the opportunity that the pending legislation will give us to take part in a greatly expanded and strengthened effort on behalf of the health and safety of America's working population. The new au-

thorities this legislation would provide us—to participate in the development of meaningful standards, to carry out and support needed research, to train needed manpower—these and the additional responsibilities that would be ours under this legislation will give us the tools we need to do the urgent task that is to be done.

On behalf of the Department of Health, Education, and Welfare I urge favorable consideration of the Occupational Safety and Health Act of 1969 so that our country can redouble the vital work of controlling the unnecessary and intolerable hazards that are too often part of the working environment.

I would be pleased to answer any questions or, if you prefer, Mr. Chairman, to ask Mr. Johnson and Dr. Ley to continue this presentation with a more detailed discussion of our activities and the legislation before your committee.

PREPARED STATEMENT OF CHARLES C. JOHNSON, JR., ADMINISTRATOR, CONSUMER PROTECTION AND ENVIRONMENTAL HEALTH SERVICE, PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, BEFORE THE SELECT SUBCOMMITTEE ON LABOR, COMMITTEE ON EDUCATION AND LABOR, U.S. HOUSE OF REPRESENTATIVES

Mr. Chairman and Members of the Committee, I welcome this opportunity to offer the support of the Department of Health, Education, and Welfare for enactment of H.R. 13373, the Occupational Safety and Health Act of 1969.

As President Nixon pointed out in his August 6 message to the Congress, this Act "will go beyond the limited 'accident' orientation of the past, giving greater attention to health considerations, which are often difficult to perceive and which have often been overlooked." The President has expressed it succinctly.

Occupational health hazards *have* been too long neglected. But as our perception of these problems has increased, so has the demand for whatever changes are necessary to provide adequate protection for workers. Passage of H.R. 13373 will enable us to respond to this demand.

There are 80 million Americans who go to work each day. Their on-the-job environment is of vital concern to the Consumer Protection and Environmental Health Service. The Bureau of Occupational Safety and Health in our Environmental Control Administration is continually developing new information about job-related diseases and methods of control. But there must be a means to translate this knowledge into effective action to protect the health of workers.

Let me describe for you, if I may, Mr. Chairman, some of the elements of the occupational setting that we recognize today. There are, in reality, two facets of the problem:

One the one hand, we still have with us old problems—health hazards that in some cases go back as far as the Bronze age. Lead, zinc, mercury, silica sand, carbon tetrachloride, carbon monoxide, and many other industrial exposures have been well studied, and there is sufficient knowledge available to control them. But still they offer threats to workers. Control procedures break down, are ignored, or are allowed to deteriorate. Our occupational health people recently restudied lead and zinc smelters in one State, and found that controls instituted almost 20 years ago had deteriorated to the point where they were little better than those they had replaced. In oher words, we have entered the Space Age without really solving some of the problms that first became widespread at the dawn of the Industrial Revolution.

At the same time, technology has created a whole new kind of work environment, with a whole new set of hazards and potential hazards. In this new world, the threats themselves are little understood and control technology, in many cases, is not perfected.

For example, high energy sources, such as lasers, which just a few years ago were tools of the scientist, are now commonplace in industry.

Berllium, a highly toxic metal which was used in the manufacture of fluorescent light bulbs until chronic beryllium poisoning was recognized as a health hazard to workers, is now finding new applications, primarily in the atomic energy field and the space effort.

New processes and massive, high-speed, frequently automated, industrial machines have created possibilities for accidental injury that go far beyond the worker's capability for self-protection.

It is patently impossible for the worker to take responsibility for his own health and safety in this complex world of physical and chemical hazards which are little understood even by the experts.

The fact is that man has created a new environment but he has not created a new man. We are the products of a slow evolutionary process, and we still have the same physical characteristics that our caveman ancestors had. We still need clean air to breathe, clean water to drink, and are still helpless against unseen or uncontrollable hazards in the environment. We have developed no second sight that tells us when an invisible beam or a seemingly harmless vapor is doing insidious damage to our health.

Certainly every worker needs to be made aware of the hazards he confronts in the workplace and educated to exercise caution—to "watch his step," to wear earplugs and a hard hat and safety shoes were required.

But we must also create a working environment in which such a person, exercising reasonable care, can be assured that sudden death or the slow process of industrial diseases will not be the wages of his work.

Certainly the occupational respiratory diseases, in terms of severity, represent one of the our most important occupational health problems, and one in which adequate controls would pay big dividends, both in reduction of human suffering and in dollars and cents savings to the workers affected, to industry, and to the taxpayer.

Three and a half million American workers are exposed to asbestos in their jobs. They face a dual threat: not only are they subject to the lung scarring pneumoconiosis of their trade, asbestosis, but they are endangered by lung cancer associated with the inhalation of asbestos fibers. Recent studies of asbestos insulators showed that one of every 5 deaths in this group were caused by lung cancer—7 times the expected rate. Half of the men who had worked in the trade had X-ray evidence of asbestosis. One in every 10 deaths were caused by mesothelioma, a cancer of the lung pleura, so rare that it strikes only 1 in 10,000 in the general working population.

Black lung, or coal miners' pneumoconiosis, is a term which has become very familiar to us in the past few months. This disease—which the British call simply "chronic bronchitis"—is caused by the inhalation of soft coal dust. It is a progressive, crippling lung disease, often complicated by emphysema in the later stages. The death rate from respiratory diseases in soft coal miners is 5 times that of the general working population.

There are other industries whose workers run an extremely high risk of respiratory disease. Uranium mining, for example, presents a very serious problem. Of the 6,000 men who have been uranium miners, an estimated 600 to 1,100 will die of lung cancer within the next 20 years because of radiation exposure on the job.

Over 3,000 cases of silicosis are reported yearly from exposure to free silica—the major ingredient of all rocks, soils, sands and clay.

For years, we had the comfortable illusion that byssinosis, the lung disease caused by inhaling cotton dust, was not a problem for American textile workers. Even though British workers using American cotton came down with this crippling lung disease, we relied on a limited X-ray survey done years ago which did not reveal a byssinosis problem. Now, our scientists are discovering that America's 230,000 cotton textile workers are also threatened by this respiratory disease.

Talc, diatomite, carborundum, sugar cane fiber, even dust from moldy silage all produce their own form of lung damage, wherever dust control and worker protection are inadequate.

Our National record in preventing occupational respiratory disease is not a good one. We have allowed too many productive people to become disabled, and finally to die prematurely, because we have not paid attention to controlling the dust, fumes, and vapors to which they are exposed.

We know by now, Mr. Chairman, that the chronic inhalation of any foreign material—cigarette smoke, polluted air, coal dust, or asbestos fibers and many others—can harm the lungs and cause disease. Since we also know that, for the most part, occupational respiratory diseases are *preventable* diseases, I believe we have a clear responsibility to take action to prevent them.

Up to now, unfortunately, there has been no systematic, sustained attack on either the job-related respiratory diseases or a variety of other occupational hazards.

It is true that during World Wars I and II, there were peaks of activity

in connection with health hazards in the war industries. In the late 40's and early 50's, the Congress stimulated an expansion of State activities by earmarking categorical funds from the general grant-in-aid program for the development of State industrial hygiene programs.

Since then, however, we have lost ground. Many of the State programs which were quite active in the early 50's have been reduced to little more than token operations. There are still a number of highly effective State occupational health programs, but the majority require expansion and improvement.

The Bureau of Occupational Safety and Health recently analyzed the status of occupational health programs of State and local governments and reviewed State occupational health legislation. I submit these reports for the record.

Deficiencies in the State programs are largely related to lack of funds, low salary scales, and lack of administrative and legislative support. The Occupational Safety and Health Act of 1969 can provide the means to correct these shortcomings and establish an effective Federal-State partnership for the control of occupational health hazards.

In addition, Mr. Chairman, H.R. 13373 will establish a mechanism at the national level for developing occupational health and safety standards and assuring uniform enforcement.

Under the Act, the Secretary of Health, Education, and Welfare is charged with the responsibility to conduct the research, experiments, and demonstrations which will assist in producing criteria that will enable the National Occupational Safety and Health Board to formulate safety and health standards.

As I indicated earlier, our Bureau of Occupational Safety and Health is already engaged in this kind of research. Studies currently underway relate to occupational hazards of asbestos, beryllium, coal, uranium, and noise. We have also had experience in developing criteria for standards. Last December, for example, the Department of Health, Education, and Welfare recommended an interim standard for bituminous coal dust to the Secretary of Interior. We are now developing a method for prescribing criteria to be used in recommending an interim standard for exposure to asbestos.

Such criteria, however, cannot protect a single worker from job-related diseases unless standards are promulgated and effectively enforced. This is what H.R. 13373 is designed to do.

Another responsibility of the Department of Health, Education, and Welfare under H.R. 13373 is to conduct a comprehensive study and evaluation of occupational health problems and to transmit a report, with recommendations, to the President and the Congress.

This type of study is critically needed to give us better information than we have now on the incidence of occupational disease, to pinpoint problem areas, and to help us establish priorities in attacking these problems.

The Department of Health, Education, and Welfare also would have the responsibility under H.R. 13373 to conduct educational programs to provide an adequate supply of qualified personnel to carry out the purposes of this Act.

At the present time, there is a serious shortage of personnel in all areas of occupational health. There is an immediate need for approximately 28,000 additional industrial hygienists, physicians, nurses, and scientists to protect adequately the Nation's workforce.

TABLE I.—OCCUPATIONAL HEALTH MANPOWER

Category	Needed	Available	Deficit
Industrial hygienists—all sectors	2,335	1,335	1,000
Industrial physicians—all sectors	6,000	2,900	3,100
Industrial nurses—all sectors	35,000	19,000	16,000
Occupational health scientists	9,600	1,600	8,000
Total	52,935	24,835	28,100

Estimates for manpower needs in the several States are based on criteria using (a) data obtained from Statewide and citywide surveys, (b) analysis of on-going programs, and (c) the distribution of the working population in four Standard Industrial Classifications (SIC) categories.

We must stimulate programs to develop an adequate supply of manpower for inspection and control activities in the field of occupational safety and health.

The Bureau of Occupational Safety and Health has already developed a plan for an in-service training program to give recent college graduates an intensive course in occupational safety and health, including formal classroom instruction and on-the-job experience. This will enable the Department of Health, Education, and Welfare to meet its immediate need for personnel to carry out its responsibilities under the Act.

In considering the overall need for occupational health personnel, it is clear that if we are to use fully our present professionals, they must be freed from the sub-professional work which now consumes much of their time and energy. Para-professionals should be used to extend the effectiveness of the profession of industrial hygiene and occupational health nursing. Technicians should be trained to take samples, monitor the effects of operation engineering controls, and conduct routine laboratory analyses.

Mr. Chairman, I have tried to touch upon the major provisions of H.R. 1337 that relate to the Department of Health, Education, and Welfare. This Department has been concerned with occupational hazards since the Office of Industrial Hygiene was established within the Public Health Service in 1914. In all the years that have passed since then, we have learned much about the health problems that exist in the workplace; we have also learned that we need a more effective instrument to attack these problems. The Occupational Safety and Health Act of 1969 will enable the Nation to get on with this important task.

My colleagues and I will be happy to respond to any questions you may have.

Dr. Ley. There is a continuing evolution, Mr. Chairman, in my opinion, in the protection of workers in this country. We have seen several stages in bridgeworkers, tunnelworkers, mineworkers, and I believe that on the basis of some of the comments here this morning there may be reason for the committee to consider additional steps in this area. But I am not aware of the total problem. I would be foolish to provide any more than a very mere comment of this sort.

Senator Mondale. We had testimony some time back that where, for example, your people would see evidence of pesticide exposure farmworkers, that you could advise the Department of Agriculture which does have authority to issue cease and desist orders or, I gather, bring criminal prosecutions under the Federal Insecticide, Fungicide, Rodenticide Act.

Has that ever been done, or don't we understand that correctly?

Dr. Ley. Perhaps the person best equipped to answer would be our general counsel, Mr. Gottlieb.

Mr. Gottlieb. As I understand the Federal Insecticide, Fungicide, and Rodenticide Act, when they find a violation they can have the product seized or bring a criminal prosecution.

Senator Mondale. Are you suggesting that there is a cease and desist possibility but are there certain remedies existing in the Department of Agriculture that could be used to protect farmworkers where they are exposed to pesticide poisoning?

Mr. Gottlieb. I am not that familiar with the statute, Mr. Chairman. I do know that the Department of Agriculture exercises control over the labeling of the insecticide, which includes bearing of cautions and warnings. They are charged by the statute to concern themselves with injury to humans. Whether that is limited to applicators or extends as far as bystanders, I really do not know.

Senator Mondale. Are you suggesting that there is a question of whether humans includes farmworkers?

Mr. Gottlieb. No, you have to read the statute in its whole context.

Senator MONDALE. Would you respond to this question in writing to the subcommittee? You might take a look at it, and tell us what the situation is, because there seems to be a conflict. One of our witnesses said that there was this responsibility in the Department of Agriculture, and that the Public Health Service could and should be notified. You might refer to the statement by Mr. Gordon before this subcommittee on August 1, where he makes this point.

(The information referred to follows:)

PROTECTION OF WORKERS AGAINST PESTICIDES

The President's Science Advisory Committee on "Use of Pesticides" in 1963 recognized that there was a need for greater coordination between the various agencies and in its report recommended that the Secretaries of Agriculture, Interior, and Health, Education, and Welfare review and define their respective roles. The Committee also recommended that health functions relating to pesticides be vested in DHEW. Pursuant to this report and its recommendations, a Memorandum of Agreement between the Department of Agriculture, the Department of the Interior, and the Department of Health, Education, and Welfare was entered into in 1964 in order to effectively coordinate the functions of the three Departments. (Copy of the Memorandum is attached). The Public Health Service of the Department of HEW in accord with the Agreement, was assigned the responsibility to review labels submitted to the Department of Agriculture and advise the USDA on health aspects associated with the use of pesticide chemicals such as warnings against undue exposure to the population, especially in household applications and to field workers. The FDA of the DHEW continued the review of intended uses of pesticides which might result in food contamination and the establishment of safe tolerances.

The agreement in general calls for exchange of information between the three Departments on uses of pesticides. Specifically, it requires USDA to furnish to the other two Departments, on a weekly basis, a listing of all proposals affecting registration and requires DHEW to furnish a weekly listing of all proposals affecting tolerances. Procedures and time limitations were specified for the lodging of objections. When objections are lodged, two weeks are provided for Departmental representatives to reach agreement. If this fails, the matter is referred to the Secretary of the Department responsible for final action in the situation and he is then responsible for making the final determination. The other Departments are also to receive advance notification of such final determination.

In July 1968, the function of reviewing pesticide labels for matters related to health as well as other health related activities was transferred to the FDA from the Communicable Disease Center of the Public Health Service.

In April 1969, Secretary Finch announced the creation of an HEW Commission on Pesticides and their Relationship to Environmental Health. The members of the Commission were charged to explore the field of environmental pollution and its consequent risks to the health of the people of this country, and to make specific recommendations for action. The Commission has made its review and submitted its recommendations. Their first recommendation was that a new interagency agreement be written between DHEW-USDA-USDI to tighten the control of registration and to develop cooperative approaches to the control of health hazards and environmental pollution. The Commission's second recommendation was to strengthen coordination of pesticide activities within DHEW. Implementation of these recommendations is under consideration, as indicated in the attached statement by Secretary Finch on November 12, 1969.

MEMORANDUM OF AGREEMENT BETWEEN THE DEPARTMENT OF AGRICULTURE, THE DEPARTMENT OF THE INTERIOR, AND THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE ON INTERDEPARTMENTAL COORDINATION OF ACTIVITIES RELATING TO PESTICIDES

PURPOSE

Coordination of activities of the three departments pertaining to pesticides with special reference to registration and the setting of tolerances to give

effect to the pertinent recommendations of the May 15, 1963, report of the President's Science Advisory Committee on "Use of Pesticides."

EXISTING DEPARTMENTAL RESPONSIBILITIES

The following responsibilities of the respective departments relate to the registration of pesticides and the setting of tolerances for pesticide residues:

Department of the Interior, Fish and Wildlife Service. Conserving beneficial wild birds, mammals, fish and their food organisms and habitat, with regard to pesticides.

Department of Health, Education, and Welfare, U.S. Public Health Service. Protecting and improving the health of man in regard to pesticides.

Food and Drug Administration. Establishing tolerances for pesticides in or on raw agricultural commodities and processed foods.

Department of Agriculture, Agriculture Research Service. Providing for the safe and effective use of pesticides, including the registration thereof.

1. Information

Each department undertakes to keep each of the other departments fully informed of developments in knowledge on this subject from research or other sources which may come into its possession. Additionally, the Department of Agriculture undertakes to furnish to the other two departments on a weekly basis a listing of all proposals affecting registration and re-registration, and the Department of Health, Education, and Welfare undertakes to furnish to the other two departments on a weekly basis a listing of all proposals affecting tolerances. Upon request, the Departments of Agriculture and Health, Education, and Welfare respectively will furnish to the other departments full information about any pending action on registration or the setting of a tolerance.

2. Procedure

(a) Each department will designate a scientist to act on behalf of such department in carrying out the terms of this agreement. The weekly listings from the Departments of Agriculture and Health, Education, and Welfare and any additional information relating thereto will be directed to these representatives.

(b) The departmental representative will review the weekly listings of actions pending. If there is reason to question any of the items on that list, this will be communicated to the originating department within one week stating the specific reason for need for further review.

(c) Upon receipt of such request the originating department will furnish the necessary information and make the necessary arrangements for further review and will withhold final action on the matter for an additional three weeks.

(d) If one department concludes that the proposal should be rejected in whole or in part, this view shall be expressed in writing and shall be supported by appropriate scientific evidence. Upon being notified, the department responsible for final action will take the initiative to work out a basis for agreement.

(e) In the event agreement is not reached among the department representatives within two weeks of the initial objection, the matter will then be referred directly to the Secretary of the department responsible for final action with such information, views, and recommendations as the three department representatives deem appropriate.

(f) The Secretary of the department charged with final action may then avail himself of whatever administrative and scientific review procedures seem appropriate under the circumstances. The other two departments will be notified in advance of the proposed final determination of the issues.

(g) The department representatives will jointly make a quarterly report concerning their activities to the secretaries of the three departments.

(h) The departmental representatives are authorized to review questions involving existing patterns of use of pesticides or tolerances upon which they have reason to believe that critical questions exist.

3. Conference

At least once each year the departmental representatives will arrange a general conference to discuss research needs, research program and policy, and the application of research findings in action programs, including public information relating to pesticides.

4. Federal Pest Control Review Board

The Federal Pest Control Review Board may be asked from time to time to consider broad questions on policies relating to pesticides involving the interrelationships of control programs, research, registration, tolerances, and general departmental recommendations to the public.

Date April 8, 1964.
Date March 27, 1964.
Date April 3, 1964.

ORVILLE L. FREEMAN,
Secretary, Department of Agriculture.
STEWART L. UDALL,
Secretary, Department of the Interior.
ANTHONY J. CELEBREZZE,
Secretary, Department of Health, Education, and Welfare.

PRINCIPAL DEPARTMENT REPRESENTATIVES TO ADMINISTER AGREEMENT ON INTERDEPARTMENTAL COORDINATION OF CERTAIN PESTICIDES

ACTIVITIES

Department of Agriculture. Dr. Robert J. Anderson, Associate Administrator, Agricultural Research Service, Room 302-A Administration Building, Telephone: 111-3658.

Department of Health, Education, and Welfare, Principal Department Representative: Dr. Richard A. Prindle, Director, BDPEC, Room 2006, DHEW So. Bldg., Telephone: 13-23191.

Temp. Mr. Frank McFarland, FDA Petition Control Branch, Bureau of Science, Telephone: 13-24524. Associate Department Representative for Food and Drug Administration Matters, Mr. J. Kenneth Kirk, Assistant Commissioner for Compliance, Food and Drug Administration, Room 3354, HEW North Building, Telephone: 13-23012.

Dr. Richard A. Prindle, Associate Department Representative for Public Health Service Matters: Dr. Robert J. Anderson, Chief, BDPEC, Public Health Service, Room 2006. HEW South Building, Telephone: 13-23191.

Department of the Interior, Dr. Raymond E. Johnson, Associate Director, Research, Bureau of Sport, Fisheries, and Wildlife, Room 3248 Interior Building, Telephone: 183-5313.

Mr. GOTTLIEB. The statute Mr. Chairman, is a creature of the Congress. The Congress determines how the statute shall be applied.

Now if the Congress in its report, for example, with respect to the Federal Insecticide, Fungicide and Rodenticide Act, which I am not suggesting is the case, but if it did say that the injury which the Department shall be concerned with shall be limited to that described by testimony presented to the committee, whatever it was, that is what the courts will determine to be the parameters of the exercise of power by the agency.

Senator MONDALE. I appreciate that you have to obey the law, and you don't have authority which isn't yours. Where the statute is vague, you have to look at the total context. That is understood. But what is your opinion of whether there is a role here played by HEW in reporting violations. I gather this is something you would like to look at further and, if you would, would you be kind enough to advise the committee as to what the opinion of the Department is as it relates to whether you do or do not have a role in helping to protect farmworkers?

Mr. GOTTLIEB. I would be glad to, Mr. Chairman.

(The information referred to follows:)

DHEW Role in Helping to Protect Farm Workers From Pesticide Hazards

The Department of Health, Education, and Welfare is concerned over the possibility of injury or hazard to the public by a number of products, including pesticides. Occupational hazards to farm workers, applicators, etc., involving persticides, are not presently encompassed in the statutory authority of the Department. It is pointed out that regardless of any lack of statutory authority, when and if any hazardous condition or practice which could imperil human health is observed by our staff, such would be brought to the attention of appropriate officials or persons. The Department does, in carrying out its responsibilities set forth in the USDA-USDI-DHEW Interdepartmental agreement, make recommendations for label warnings designed to promote the safe use of pesticides. The results of these studies may provide valuable information on the hazards of pesticides to farm workers

The Department of Health, Education, and Welfare also pursues energetic educational programs directed toward lay citizens and health professionals, the first one on safe use of pesticides and the other on pesticide poisoning: its diagnosis, treatment, and prevention. These programs are carried out through personal contact, speaking engagements, audiovisual materials (films, TV spots), printed material, and formal class instruction. In addition, whenever an actual poisoning comes to the Department's attention, details are published in the morbidity-mortality report as a reminder to the health profession. This is the Department's present role in dealing with pesticide hazards to farm workers.

[News Release, November 12, 1969]

U.S. Department of Health, Education, and Welfare, Office of the Secretary Washington, D.C. 20201

All statements and reports issued today are embargoed until the question and answer session of the news conference.

November 12, 1969.

Statement of Robert H. Finch, Secretary of Health, Education, and Welfare on the Commission on Pesticides

This April, I announced the creation of an HEW Commission on Pesticides. Dr. Emil Mrak, former Chancellor of the University of California at Davis and an internationally recognized food scientist, accepted the position of Commission Chairman. He put together a distinguished committee of experts from a wide selection of disciplines and immediately set to work. The Commission had the full support of a backup team of staff experts from HEW agencies, and from the Departments of Agriculture and Interior. You have a list of the Commission members. At this time I wish to express my gratitude for their devotion and dedication.

In the course of their review, they examined scientific reports on over 600 active pesticidal chemicals which are in use in this country and which are formulated in more than 60,000 ways.

Commission members were charged to bring back specific recommendations for action and they did. Several weeks of editing and printing time remain before the full Commission Report can be published.

I have chosen at this time to release the specific recommendations made by the Commission and to discuss the action we are taking and which we propose to take.

The Commission's first recommendation was that a new interagency agreement be written between this department and the departments of Agriculture and Interior to tighten control of registration and develop cooperative approaches to the control of health hazards and environmental pollution. As it now stands the legal authority to register pesticides is vested in the Secretary of Agriculture, but we are working toward a new agreement that would preclude the registration of any pesticide on which either the Secretary of HEW or of the Interior is not fully satisfied. I have discussed this matter with Secretary Hardin and with Secretary Hickel and I feel that a cooperative agreement ensuring full consideration and attention to the health and environmental impact of pesticides will be accomplished without asking for new legislation. As a step in this direction, I will refer the Commission's Report to the Environmental Quality Council. I have had discussions on this with Dr. Lee Du-

Bridge, and he assures me it will be on the agenda at the group's next meeting on November 20.

The Commission members did not hesitate to take a candid look at this department and their second recommendation to us was to strengthen our departmental coordination. The plain fact is that the responsibility for activities relating to the health hazards of pesticides has been widely scattered throughout HEW. Efforts to draw HEW pesticide functions together have been underway, and I have directed Assistant Secretary Roger O. Egeberg to review HEW research and regulatory programs for pesticides to be sure that we have a consolidated and unified effort.

We come now to the specific chemical that stimulated us to call the Commission together initially. The finding of excessive concentrations of DDT in coho salmon caused us to launch this study into the use of pesticides, their effect upon food safety, and the adequacy of our knowledge of their effects upon human health.

While DDT certainly has saved many lives in many countries, nevertheless it is the conclusion of the Commission that the use of DDT and DDD be restricted within two years to those uses essential to the preservation of human health or welfare and approved unanimously by the Secretaries of HEW, Agriculture, and Interior.

It should be emphasized, nonetheless, that despite the restrictions we will set on its usage, unavoidable residues of DDT will continue to be found in the ecological chain for a period of years. We will have to set up reasonable methods to make use of our food supply without undue hazard to human health, but in full recognition of the DDT it may already contain.

One of the basic research problems that the Commission has brought to our attention is that both industry and public agencies tend to focus research attention on the new and experimental. Industry does this because its efforts must be geared to proving the safety of a pesticide so that it can be placed on the market. Government research tends this way because it must be prepared to exercise judgment as to the safety of the newly offered products.

However, it is a recommendation of the Commission that more research be directed toward gaining a further understanding of the ecological dynamics and public health implications of DDT even though we will be using much less of it. As the persistent pesticide most widely distributed in the environment it is worthy of our continued study.

There are several other pesticides and families of compounds that are persistent and that can cause environmental contamination. The Commission has specifically pointed them out and suggested restricted usage, in the fourth recommendation. Registration of labels and clearances for usage of all of these pesticides, including DDT, are responsibilities of the Secretary of Agriculture. I have discussed the Commission Report with Secretary Hardin and will make every effort to implement these recommendations.

Inherent in all of these decisions is the extremely difficult problem of measuring hazards to human health. The whole matter of transferring results of animal experiments to prediction of human effects still relies heavily on the intuitive judgment of skilled observers. We do feel that prudent steps must be taken to minimize human exposure to chemicals that demonstrate undesirable responses in the laboratory at any level. There should be continuing review and adjustment of pesticide residue tolerances.

We must protect the health and welfare of the public. That is the basic charge of this Department. But it is not in the best interest of the public to permit unduly precipitate or restrictive action based only on anxiey. The indiscriminate setting of zero tolerances for widely distributed pesticides could have a disastrous effect upon our national supply of essential foods.

This has been stated by the Commission, which further suggests that pesticide tolerances might be measured against graded standards that take into consideration both the need for public health protection and the need for producing an adequate and wholesome food supply. Existing law requires us to take both factors into account in establishing pesticide tolerances.

This recommendation appears to be the most realistic basis for a sound and sensible policy to be followed by this department in meeting its public health responsibilities. We are instructing the affected agencies in HEW to study this recommendation and advise me as to appropriate implementation. We will also announce soon the makeup of a Pesticide Advisory Committee to assist our staff. This group, as was the Commission, will be drawn from professional, industrial and academic specialists in related fields. Judging from the work of the Commission, it should be of great assistance to us in

identifying gaps in research that need to be closed, and in evaluating the complex risks and benefits that must be considered in establishing tolerances and standards for pesticide usage.

To enable us to proceed with this policy of reevaluation it is important that we interpret the Delaney amendment to the Federal Food, Drug, and Cosmetic Act specifically as it was enacted. This amendment requires the removal from interstate commerce of any food additive shown to be capable of inducing cancer when fed to experimental animals. The Delaney Amendment was conceived in high purpose and has served a useful function. The Department's General Counsel has pointed out that the Delaney Amendment does not apply to pesticide chemical residues in raw agricultural commodities or in foods processed from lawful crops. Nor does it apply to the unavoidable environmental contamination of foods. The unbelievably sophisticated and sensitive measuring devices now in the skilled hands of our laboratory technicians can measure one twentieth part of one unit in a billion. Measurement techniques have improved 1000 fold since the Delaney Amendment was enacted eleven years ago. If the Delaney Amendment, as it now written, were to be strictly enforced for pesticide residues it would convert us to a nation of vegetarians. Much of our red meat, many dairy products, some eggs, fowl and fish—all parts of basic food groups deemed necessary to a balanced diet—would be outlawed because of very small pesticide residues from the ecological chain.

The Commission has made a number of somewhat technical recommendations having to do with the pooling of our information, the development of pesticide protection teams and increasing support for research into pesticides and their relationship to human health and the environment. They have drawn attention to vast gaps in our basic knowledge. We must establish priorities for this research and mobilize the scientific talents of the nation to fill in this needed information.

We especially need support for programs to better evaluate the benefits of specific pesticides and their relation to alernative methods of pest control. We need to develop less hazardous pest control techniques that are highly specific and leave a minimum of persistent chemicals in the environment. There is inherent a basic need for an improved understanding of the relationship of man to his environment, and a very real need to improve our techniques for predicting the effects of chemicals on man himself.

We can feed in bred laboratory rats doses of chemical many times the usual human exposure and some of the animals may develop tumors. We cannot translate this information to man with certainty, therefore we must continue to improve our animal predicting systems, so that they will have more and more relevance to man.

The Commission suggested that we sharpen our legislative and administrative policies concerning labeling and advertising practices, the granting of experimental labels, and on the very important and too often neglected matter of the safe handling and disposal of pesticides. They also suggest the monitoring and control of effluents from plants manufacturing, formulating or using pesticides. They have specifically suggested that the current Model Pesticides Law that we suggest to states and local communities be expanded to properly cover the disposal of surplus pesticides and used containers. We we will be drafting administrative changes and model legislation to conform to these very practical suggestions. This will be done in consultation with the Council of State Governments. And we will make a greater effort to obtain state and local adoption of the model law.

Our responsibility is to the American people, but the problem of environmental pesticide pollution is global. It requires international cooperation to solve problems of these dimensions. Canada, Great Britain, Sweden and many other nations have shown an awareness of the hazards to man's environment and are fellow workers in this field. We have cooperated in the training of technical personnel from other countries, and we must increase our participation in international cooperative efforts to abate contamination.

In this discussion of administrative and legislative proposals we may forget that it is not your government that manufactures and markets pesticides. It is private industry. The chemical firms that manufacture and formulate pesticides carry the burden of proving their safety and efficacy before any such chemical can be marketed. The Commission found in its study that 55% of the funds spent nationally for agricultural research is spent by private industry. It further estimates that there is an investment of around $6

million in research and development before a new pesticide reaches the market.

It is right that we ask industry to provide us with pesticides that are highly specific in their action, targeted to do only one job with a minimum of persistence in the environment and few, if any, side effects on non-target species. But when we do this we are also asking industry to look at a smaller market, and a larger cost.

There is still little doubt that our actions will discourage investments in this field unless we provide some incentives for this very important job. We will be meeting with industry leaders, to consider a wide-range of suggestions. It is important that all of us who are involved, government and industry alike, work together toward solving the essential problems of our environment and we intend to pursue the matter of industry cooperation vigorously.

In conclusion, you may well ask "Where are we now? How much do we know about pesticides? How much do we know about their effect on man and his environment?"

I can tell you that with the report of this Commission we have made a sound beginning. The Commission's study shows that we, as a nation, have a tremendous need for ecological research on a large scale, We have an understanding of the methods of evaluating safety and establishing safety standards from certain types of injuries, but we need to learn more about the basic metabolic processes of the human animal.

We have to know more about the effects of the chemicals we use. We welcome the cooperation of industry in the search for alternatives to some of the pesticides we now employ.

Overall, pesticides have been of great benefit to mankind through controlling diseases and by increasing his food supply. It is essential that their intelligent use not be accompanied by unintentioned hazards to man or to his wholesome environment. Continued research and continued evaluation of man's ecology can provide us the necessary guidance.

Senator MONDALE. When you were notified about a month ago of these conflicting laboratory reports by Safeway, we called and asked for copies of the reports. You refused to give them to us. Why was that?

Mr. KIRK. Mr. Chertkov called me one evening and we discussed it. He said he just got through talking to the Safeway people. He said he understood I had the reports and he would like to get them. I explained that I did not have all of the reports. I only had the two England Laboratory reports. I told him that we had looked into the England work on the first one and we had concluded that we had serious question, let us put it that way, that the laboratory had correctly interpreted the results. I told him that I had never heard of the Eastawai Laboratories until this incident arose, that I did know of the other laboratory and had known of its work for years. I did not have all of the reports. They were essentially Safeway property, presumably Safeway paid for them. They had all three of them or all four, as you want to call them. I asked him if he had asked Safeway for them. I don't recall exactly what he said, but I don't think he said yes or said no.

Senator MONDALE. What bothers me, maybe you can respond to this, is that FDA's report said there were no pesticides on any grapes.

Mr. KIRK. That is right.

Senator MONDALE. But you knew, or did shortly thereafter, that there were four samples taken in this area which showed high aldrin residues. How does the public protect itself? We couldn't get the information from you. You would not give it to us.

Mr. KIRK. I had no hestitation in giving the information to him, sir. I gave him exactly the figures that they had given me.

Senator MONDALE. Let me put it this way, if we had not found out about it through the underground, this committee would have been left with only one bit of information, yours, that there is no problem at all. I take it that it is only through inadvertence that we know there is this question.

I wonder how Congress does its work when it must rely upon that kind of circuitous, unauthorized source of information.

Mr. KIRK. Well, sir, I didn't know about these Safeway reports until a representative of your committee got in touch with Dr. Meyer of the CPE office, and he got in touch with me.

Senator MONDALE. He did not know either.

Mr. KIRK. I received a call from Dr. Meyer which said that he had been told that your committee people had learned of some results by Safeway. He asked me to find out about them, and I did.

Senator MONDALE. There is an old principle of law that when you are trying a lawsuit and there is relevant information that you know about, which is essential to proper factual determination, even if it is contrary to your case, you have a duty to disclose it, that silence is not neutral at that point.

I don't want to be critical but I think we could have had a little more help from you than we got.

One final question: Did you review all three samples prepared by the England laboratories?

Mr. BURKE. No, sir. I only saw the gas chromatographic record from one sample and the paper chromatographic record from one sample.

Senator MONDALE. Is that the first sample?

Mr. BURKE. I assume it was because we were talking specifically about aldrin. I can't absolutely say it was, though.

Senator MONDALE. So that the last two you did not review at all?

Mr. BURKE. No, sir.

Senator MONDALE. Did you talk with Dr. Windlan about some of your criticisms of his methods?

Mr. BURKE. No. I didn't say directly to him that I disagreed with him on such and such points. I think he gathered though, that I was a little bit amazed at some of his conclusions.

Senator MONDALE. Did you tell him which techniques you objected to?

Mr. BURKE. No. I didn't tell him anything directly. I think he would have to conclude from my questions what I was thinking.

Senator MONDALE. He could have concluded that?

Mr. BURKE. He may have.

Senator MONDALE. It might have been that later tests incorporated your criticisms?

Mr. BURKE. I don't think I suggested any specific testing that would have clarified the identity.

Senator MONDALE. Thank you very much.

Dr. Ley, we will print at this point in the record your prepared statement in its entirety, and other pertinent material submitted for the record.

(The material referred to follows:)

STATEMENT
BY
HERBERT L. LEY, JR., M.D.
COMMISSIONER OF FOOD AND DRUGS
CONSUMER PROTECTION AND ENVIRONMENTAL HEALTH SERVICE
PUBLIC HEALTH SERVICE
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
BEFORE THE
SUBCOMMITTEE ON MIGRATORY LABOR
OF THE
SENATE COMMITTEE ON LABOR AND PUBLIC WELFARE
SEPTEMBER 29, 1969

Mr. Chairman:

Immediately following the hearings before your Subcommittee on August 1, 1969, the Food and Drug Administration made a survey of table grapes on the retail market to determine if unsafe pesticide residues were present. Forty-eight samples were collected as follows: twelve samples of grapes were collected from retail stores in each of four Metropolitan areas--Los Angeles, Chicago, New York City, and the Baltimore-Washington, D. C. area. We specifically requested that samples be collected from the Safeway Store and the Giant Supermarket here in Washington, D. C., from which a United Farm Workers representative informed us he had purchased the grapes for the analysis reported by Mr. Jerome Cohen to your Subcommittee on August 1. We were able to obtain a sample at the indicated Safeway Store, but we did not find a Giant Supermarket at the address given to us. We did, however, obtain a sample from another Giant Supermarket further out on the named street. These samples were collected on the afternoon of August 1, 1969.

In addition to these 48 samples, our San Francisco District collected 12 samples of grapes from packers or shippers in the San Joaquin Valley of California. Our Chicago District also collected an additional 12 samples from produce houses and our Los Angeles District collected 3 more samples from packers in Mecca, California.

All of these samples were collected during the period from August 1 to August 6, 1969. They were promptly analyzed for pesticides by our District laboratories in Los Angeles, San Francisco, Chicago, New York and Baltimore.

The gas liquid chromatographic analytical procedure used in this survey detects and measures about 60 pesticide chemicals, including aldrin, dieldrin, kelthane, endrin, DDT and its analogs, tedion, heptachlor, heptachlor expoxide, ethion, lindane, parathion, methyl parathion, and diazinon. Only residues of kelthane, DDT compounds, ethion, tedion, dieldrin, and diazinon were found in the samples. All residues were substantially below tolerances. No residues of aldrin were found.

We submit for the record the results of this survey showing the grower or packer, the area where samples were collected and the analytical findings. (Exhibit A)

Since that survey, we have continued our normal pesticide residue surveillance work on raw agriculture products. As part of this program, our San Francisco District has, as of September 23, 1969, collected and completed the examination of 12 additional samples of grapes from packers or shippers in the San Joaquin Valley of California. These samples have been examined for pesticides using the same method as mentioned before. None of these samples were found to contain pesticide residues over tolerance, in fact nine of the samples were free of any residue detectable by the method employed. The residues on the other three samples were substantially below tolerance. We submit for the record the results of these analyses also. (Exhibit B)

Mr. Chairman, you requested that I discuss the legal framework under which we regulate pesticide residues in or on foods and how a residue tolerance is established.

Regulation of the use of pesticides is carried out by several agencies. The responsibility for registration of pesticices and other economic poisons is placed in the U. S. Department of Agriculture. These products may not be legally shipped in interstate commerce without prior registration as required by the Federal Insecticide, Fungicide, and Rodenticide Act. To be registered, the pesticide must be shown to be safe when used as directed and effective for the purpose claimed on the label.

Under the Pesticide Chemicals Amendment to the Federal Food, Drug, and Cosmetic Act, raw agricultural commodities bearing or containing residues of pesticides and pest control products, not generally recognized as safe by qualified experts, are classed as adulterated unless such residues are within the limits of previously established safe tolerances (which may even be zero). Such tolerances are established only after the USDA has certified that the pesticide chemical is useful to agriculture when employed as proposed in the petition. Also, the petitioner must present FDA with experimental evidence on toxicity to establish what residues are present and that such residues will be safe. He must show that the tolerances can be met under the practical conditions of pesticide usage. The petitioner must also specify the conditions of use on the labeling for the pesticide. Exemptions from the requirement of a tolerance are also authorized if not inconsistent with the public health. Raw agricultural products are defined to include all foods in their raw or natural state.

The industry or firm promoting the use of the pesticide chemical is responsible for obtaining and submitting proof that any residue remaining on food is safe for the consumer of that food. The Food and Drug Administration is responsible for the scientific judgment concerning the safety of a tolerance. In arriving at a decision that a proposed tolerance is safe, Food and Drug scientists use all available information, in addition to that supplied in the petition.

In general, a petition for a tolerance for a pesticide is required to contain certain basic information:

1. It must contain information showing the identity, composition, chemical name and common name.

2. It must set forth the conditions of use including directions, limitations and restrictions.

3. Methods of analyses must be described including validation studies, accuracy checks and applicability to the total toxic residue. The methods must be practical for regulatory control use.

4. The petition must contain residue data reflecting the most strenuous conditions of use (maximum dosage and number of applications), the major geographical production areas and in certain cases data on the processed food.

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5. It must contain acute, sub-acute and chronic toxocity studies in animals, covering different species, different dosages and different spans. The extent and complexity of these studies will depend on the type of compounds involved and the magnitude of residue on edible crops.

6. Reproduction tests spanning two or three generations and three different dosage levels are required in setting tolerances on all but "negligible residues."

Pesticide tolerances are set forth in the Code of Federal Regulations, Title 21, Part 120.

It is thus obvious that the requirements for setting a tolerance for a pesticide are most stringent. These data requirements are subject to continued review by FDA. New scientific data and advances in the evaluation of safety data are considered. Data requirements are changed when indicated. Tolerance setting is not a static process. New pesticide chemicals, formulations and other methods of insect control are constantly being developed. New tolerances are required and existing tolerances must be reviewed in terms of current good agricultural practice and need in keeping with the policy that residue tolerances should not be higher than what result from the amount of pesticide necessary for safe and effective use.

For example, FDA has recently published an order to reduce DDT tolerances. This action was initiated by a finding that good agricultural practices would permit lower tolerances; in fact, analysis of a large number of

samples over the past several years showed that the level of DDT found on most fruits and vegetables is far below the 7 parts per million tolerance for that pesticide. Residue tolerances of aldrin, dieldrin, captan, folpet and TDE also have been reduced recently.

If the review of the petition and all other available data shows that the requested or proposed tolerance for a residue is safe, then the tolerance is established by promulgation of a regulation. It should be emphasized that the tolerance is set at the lowest level resulting from that use of the pesticide which will accomplish the intended effect, even though a larger amount of the residue may have been shown to be safe to the consumer as gauged by the animal feeding studies. There must be a substantial margin of safety between the largest amount of the residue that produces no effect in the test animals and the amount which may remain on the food crop.

Obviously the establishment of safe residue tolerances does not, in itself, protect the consumer. Effort must be expended to enforce the tolerances to ensure that the regulations are being followed. FDA has for many years carried out an active program in this area of consumer protection. Our inspectors visit growers, county agriculture agents, pesticide dealers, packing sheds and pesticide applicators. They are alert for any indication of pesticide misuse. They collect samples of crops, both pre and post harvest, for laboratory analysis. A number of States also are active in policing both pesticide usage and residues on crops. We exchange information with these State officials so that all possible steps can be promptly taken to remedy any situation where over tolerance residues are found.

Any food product which is, or has been, in interstate commerce and which is found to contain an illegal residue is subject to seizure and condemnation. The persons responsible for shipping such food are also subject to criminal prosecution. In our surveillance and control activities, during the period from July 1, 1968 to June 30, 1969, we examined approximately 12,398 samples of foodstuffs, both domestic and import, for pesticides. More than half of the samples did contain residues of pesticide chemicals, the majority of these residues were well below tolerance levels. However, 27 shipments were seized in domestic commerce and 135 import shipments were detained at the port of entry, because of illegal residues.

In addition to these surveillance activities, we also conduct "market basket" or total diet studies. These can be characterized as the final check on the tolerance system.

In these studies, samples of a variety of foods are purchased at retail stores in five different regions over the country. The proportion of individual food items used in these studies was developed by the U. S. Department of Agriculture and is based on the diet of a 16 to 19 year old male, the biggest eater in the entire population. The quantity of this diet is approximately double that of the average individual. The samples of food are prepared as for consumption and then analyzed for pesticide residues. Throughout the four years of this study, the dietary intake of pesticide chemicals has been below the acceptable daily intake established by the FAO/WHO Expert Committees, and below those intake levels anticipated by our scientists when considering proposals for tolerances.

FDA is also engaged in continuing research in developing better analytical methodology for pesticides. As we stated earlier, when a new chemical is introduced a specific method for its detection is required. This single specific method may be adequate to determine the amount of that chemical on a given food at a given time after application, but we are often not in a position to know which of the many chemicals may have been used on a food crop. Therefore, we do not know what specific method to apply. The problem is further compounded by actions which may convert the original chemical to other compounds after application. As an example, aldrin starts converting to dieldrin shortly after application.

Sometimes these altered compounds are more important from a toxicity viewpoint than the original chemical. Our chemists, therefore, need methods to measure any of these chemicals present.

Our research efforts have been thus directed toward the multi-residue methods or those which measure many different chemicals simultaneously. In this multi-residue methodology, FDA chemists have been leaders. The ideal method would be a universal one which would detect and measure all of the original pesticide chemicals and all the significant alteration products which may have formed. The scientists have not, of course, achieved this ideal, but they have made considerable progress.

Contrary to a popular misconception, gas liquid chromatography is not a simple operation where the sample is placed in a machine by a technician and the answer comes out in a ready to use form. Using the gas liquid

chromatography, multi-residue methodology, a chemist with proper training, experience and equipment can analyze a sample of any of a large variety of foods and simultaneously obtain a high degree of accuracy in identifying about 60 different residue chemicals and measuring them quantitatively, all in the span of several hours. The information from the gas liquid chromatography equipment does not automatically identify the pesticide residue. It is essential that this data be evaluated by an experienced and competent analyst to establish a tentative identification so he can determine what further tests are necessary to confirm the identity. The method produces reliable results. There are many paremeters, which must be fully understood and well controlled, otherwise the results can be misleading or misinterpreted.

Mr. Chairman, you asked about FDA's actions after learning about some tests on grapes conducted for Safeway Stores. The information that such tests had been conducted came to us from a member of your staff and we investigated. We were informed by representatives of Safeway, early in September, that they had some samples analyzed following the August 1 hearing. We were informed verbally of the reported results of the analyses and were furnished, by Safeway, with a copy of two reports from the C. W. England Laboratory, Washington, D. C., identified as the results on grape samples submitted by Safeway to that laboratory. There was a wide range in the findings on the various samples as given to us by the Safeway representatives. The range was from one laboratory reporting "no aldrin or dieldrin, 0.11 ppm DDT and a trace of some identity non-determined pesticides," to another laboratory reporting 16.8 to 19.1 ppm aldrin and dieldrin residue. These varied results

were reportedly obtained on grapes from the same lots in possession of Safeway. We, of course, cannot vouch for the accuracy of any of these reports. FDA has found no samples of grapes which bore residues confirmatory of the aldrin-dieldrin findings of the commercial laboratories mentioned.

We have no information about Safeway cancelling orders on table grapes because of finding high levels of pesticides.

We have, as previously stated, continued our surveillance program of examining samples of various raw agriculture products, including grapes. To date, we have not encountered any residues in grapes which exceed the established safe tolerances. In 334 samples of grapes, FDA has examined in the past 2 3/4 fiscal years, no illegal residues of aldrin have been reported, nor were any found in the surveys mentioned earlier. If we should find grapes or any other food containing an unsafe pesticide residue, we would take the appropriate steps to remove that product from the channels of consumer commerce.

This concludes may statement Mr. Chairman. If you or the members of your Subcommittee have questions, I will be happy to try to answer them.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
FOOD AND DRUG ADMINISTRATION,
Washington, D.C., October 13, 1969.

HON. WALTER F. MONDALE,
Chairman, Subcommittee on Migratory Labor, Committee on Labor and Public Welfare, U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: I was of course concerned when, at the hearing on September 29, you expressed the view we should have checked the Eastawai Research Laboratories and the Strasburger and Siegel Laboratories at Baltimore, Maryland, since they too had examined samples of the grapes submitted to them by Safeway Stores earlier this year.

Because of this, I arranged for Mr. Jerry Burke, accompanied by an inspector from our Baltimore District, to visit both of these laboratories on October 2 and 3, 1969, to obtain the details of the procedures employed in the pesticide residue analyses of these grapes.

I now have Mr. Burke's reports. In the case of Eastawai Research Laboratories, Mr. Burke's conclusions were:

"In view of the questionable analytical procedures used, such as, no cleanup to remove electron capturing substances, insufficient resolution by GLC, and multiple unexplained peaks in chromatograms, the inexperience of the laboratory staff in pesticide residue analysis, and the lack of knowledge of the laboratory staff in the chemistry and literature of pesticides, it is my opinion that Eastawai Research Laboratories' analysis of grapes for Safeway Stores is completely unreliable. Mr. Ivan Rowe was informed of my opinion of their analysis."

In the case of Strasburger and Siegel Laboratories, it was determined that the firm was following exactly the procedures set forth in the Pesticide Analytical Manual and had had extensive experience in this area. Mr. Burke concluded:

The methodology employed and their overall knowledge in pesticide residue analysis give no reason for questioning the results of analysis of grapes for Safeway Stores by Strasburger and Siegel."

Sincerely yours,

J. K. KIRK,
Associate Commissioner for Compliance.

PESTICIDE MULTIRESIDUE METHODOLOGY

by J. William Cook

Before the Food and Drug Administration establishes a tolerance for use of a pesticide chemical on food products as required under the Pesticide Chemicals Amendment to the Food, Drug, and Cosmetic Act, the Agency requires that there shall have been developed a method of analysis to enforce that tolerance: a method capable of detecting and measuring the amount of the chemical in the food products on which it is to be used.

To assess the significance of pesticide residues in the food supply we need a practical method of chemical analysis sensitive and reliable enough to provide the data needed for assessment. The pesticide residue research chemist has made tremendous progress in fulfilling these requirements but he still has much to do.

Up to 1944 the primary pesticide chemicals were a few inorganic chemicals such as compounds of arsenic, lead, sulfur, and fluorine. Today the problem of chemical analysis is of considerably greater magnitude than for these few inorganic elements. Since the advent of the organic pesticide chemical DDT in 1944 the number of organic pesticide chemicals has steadily increased, and today there are some 800 on the market. Many are used in food production and for each, theoretically, an analytical method is needed.

As new chemicals have been introduced, new, specific methods have been developed to detect them. Although a single specific method for a given chemical may be adequate to determine the amount present in food at any given time after application to the growing food plant, the regulatory chemist is not in a position to know which of the many chemicals may have been used on the food crop before it enters the channels of commerce. Therefore, he cannot know which specific method to apply. This problem has been compounded because the action of light and air or of enzymes inside the plant or animal, it was found, caused many pesticide chemicals to convert to other compounds after application. Since these altered compounds often were the important toxic chemicals, the chemist needed methods to measure the amount of any of these chemicals present.

To the FDA chemist it was obviously impossible to monitor the food supply effectively by the specific methods since there simply were not enough chemists or facilities at hand. FDA pesticide chemists thus directed their research toward multiresidue methods—those which measure many different chemicals simultaneously. In this multiresidue methodology FDA chemists have been leaders. Those groups besides the FDA which are primarily concerned with food products of unknown spray history include State food and drug laboratories and government laboratories of other nations. Others concerned with residue analysis of foods are more likely to know which chemicals have been applied to the food and thus to know the specific analy method needed.

The ideal method of analysis would be a universal one which detected and measured all of the parent or original pesticide chemicals and all the significant alteration products which may form. Although FDA scientists and others have not achieved this ideal, they have made considerable progress toward that end.

Pesticide chemicals can be divided into general groups, each group member possessing chemical characteristics similar to those of the others in that group. The largest group includes those organic compounds which contain organically bound chlorine, such as DDT, BHC, dieldrin, and heptachlor; another large group contains phosphorus: malathion, parathion, Phosdrin, and Trithion; still others contain nitrogen or sulfur. Some contain two or more of these elements. Trithion, for instance, contains chlorine, phosphorus, and sulfur, but is classified as an organophosphate because its toxicity is due largely to the presence of phosphorus.

Using the current FDA multiresidue methodology, a chemist with the proper training, experience, and equipment can analyze a sample of any of a large variety of food products and simultaneously obtain a high degree of certainty in identifying about 60 different residue chemicals and measuring them quantitatively—all in the span of a few hours. This is more than can be accomplished in a matter of days by 50 or more chemists performing separate analyses for each residue. It is economically and physically impracticable to provide meaningful food monitoring by the specific methods, but FDA does it quite economically by the multiresidue method. The analyses must be performed or supervised by a competent pesticide residue chemist. For although the method potentially can produce accurate and sensitive analytical results, it is complex and has many parameters which, if not fully understood and well controlled, may produce results which can be misleading or misinterpreted, with detrimental implications for public health.

The present methodology has been well studied and validated for many chemicals in many food products of plant and animal origin. Validation work has shown consistent recovery of 90 percent or more of the residue present for any of about 60 pesticides, mostly from the organochlorine group. A few of the organophosphorus compounds are recovered and measured, but not their metabolic or alteration products.

The method is sensitive to well below the legal tolerance established for many pesticide chemicals. It is adequately sensitive for the highly toxic compounds, and since the analysis is made for all compounds simultaneously, the results depend on the chemistry instead of the toxicity. Therefore, many are measured much below the legal tolerance figure.

Although some people have expressed belief that the methods are more sensitive than needed, this fine sensitivity has many advantages. For instance, FDA has analyzed a number of "total diet" or "market basket" samples, the results of which are helpful to FDA as well as other national and international health agencies. High sensitivity is important in the analysis because these "total diet" samples are composites of a number of products, and if the methods were not highly sensitive, significant amounts in part of the samples in the composite might be diluted by the other parts of the composite to below the detectable level.

FDA has been able to develop and improve multiresidue analysis over the past 15-20 years by taking advantage of the many new techniques that have become available to chemistry and adapting them so as to enhance the method's capabilities. Since the Agency has had to evaluate so many parameters, it has taken an organizational approach in which a number of research chemists, largely in the Pesticides Branch of the Division of Food and later the same Branch in Division of Food Chemistry, oriented their research toward the common goal of developing the multiresidue method.

The current multiresidue system is referred to as a gas chromatographic method, but gas chromatography is only part of the process, albeit an important one. Generally the method can be divided into these four major steps: (1) sampling, (2) extraction, (3) isolation (commonly called cleanup in residue work), and (4) determination (both identity and measurement). Gas chromatography is used primarily in the determination step. Although sampling (Fig. 1) is an important part of any analysis, we will not treat it further here except to say that unless a sample adequately represents the entire lot of any product analyzed, there is no value in running the rest of the analysis.

The three remaining steps are interrelated and in some instances hardly distinguishable from each other. Except in a few instances—for example, some radioactivity analysis—it is almost always necessary to dissolve the chemical for which the analysis is designed away from the bulk of the sample before determination can be made. This is certainly so where there is usually at least one million times more food product than residue chemical.

Ideally the extraction process (Figs. 2 & 3) should dissolve all the residue and as little of the other parts of the food product as possible. But almost invariably much more material than the pesticide residues is extracted and, therefore, the pesticides must be isolated or separated from the coextracted impurities. Isolation removes the pesticide from most of the dissolved food product so that nearly pure chemicals are available for the determinative step.

Most of the early organic pesticide chemicals (the organochlorine ones) were oil soluble, so organic solvents such as benzene, hexane, and petroleum ether were used as the extractants. Chemists then believed that the residues were borne primarily on the surface of most products. Extraction consisted of washing the surface of food products with these solvents. This proved effective to some extent. But A. K. Klein, an FDA chemist, showed in 1958 that certain residues, even surface residues, were not removed efficiently with these solvents—which are immiscible with water. Only a small fraction of the residue in products such as frozen vegetables was extracted by the surface wash process.

Dr. Klein experimented with the technique of using a Waring Blendor to grind and mix the food product with isopropyl alcohol (a water miscible solvent) and petroleum ether into a one-phase system. This one-phase system proved much more effective in solubilizing residues of the chlorinated compounds than the older, immiscible systems. But it also dissolved more impurities, so the need was greater for an efficient isolation procedure. Other organic solvents miscible with water such as acetone and dimethyl formamide were found to be just as effective as the isopropyl alcohol-petroleum ether solvent mixture in extracting both residues and interfering materials.

In 1959 R. Moddes and the writer, as FDA chemists, found that acetonitrile was a particularly effective extraction solvent for organophosphorus pesticides and did not dissolve as much impurities as other solvents. P. A. Mills and other FDA chemists studied acetonitrile extensively as an extractant for diverse residues, and found it so effective that it has been adopted as the extraction solvent for the FDA multiresidue method. FDA chemists have proved that 90-100 percent of the residue present from each of the 60 chemicals included in the multiresidue method may be extracted from most food products by this solvent.

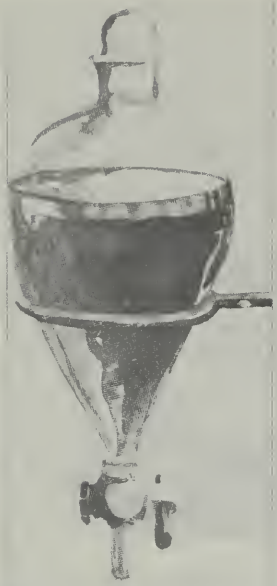
The isolation (or cleanup) step is vital to the process and must be carried out effectively before reliance can be placed on the last step of the procedure—that is, the determinative step for multiresidue analysis. Some chemists advocate skipping

FOUR SECTIONS TO ANALYTICAL OPERATIONS

1 *A small representative sample is prepared by compositing equal portions of each of a number of units of the food product*

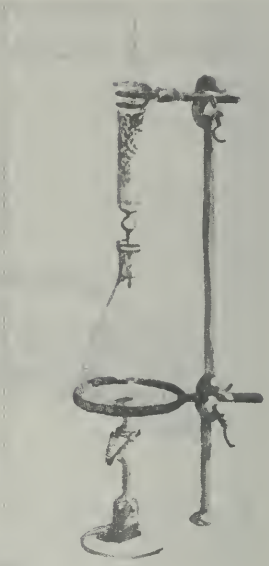
2 *The composite sample is extracted by grinding in the solvent, acetonitrile, in a power blender.*

3 *The solvent is separated from the insoluble material by filtration*

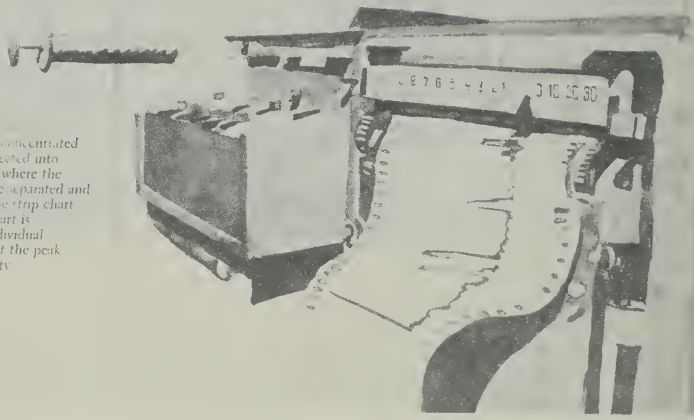


4 The first step of isolation or purification is a solvent partitioning process in which immiscible solvents are chosen so that the pesticide favors one solvent and the unwanted plant material favors the other solvent. The solvents are thoroughly mixed by shaking the funnel shown; then the mixture is allowed to stand until the solvents separate.

5 The second step in the isolation utilizes column chromatography. The solvent containing the pesticide is poured through the column which adsorbs the pesticide and some plant material; the plant pigments and others, and allows some plant material to pass through. This is discarded. Then a different solvent is chosen to elute all the pesticide and as little plant material as possible from the column. This solvent is caught in the double flask.



6 The solvent is evaporated to concentrate the pesticide in the small flask at the bottom.



7 An aliquot of the concentrated pesticide solution is injected into the gas chromatograph where the individual pesticides are separated and recorded as peaks on the strip chart. The position on the chart is characteristic of the individual pesticide and the size of the peak is dependent on quantity.

the isolation process to save time. But FDA feels it is imperative that good isolation techniques be followed rigorously if we are to accurately determine identity and quantity.

In the FDA multiresidue method the final substeps in the isolation are to remove oily or waxy compounds from the acetonitrile solution by treating it with a solvent derived from petroleum, called petroleum ether (a petroleum fraction), which is immiscible with acetonitrile. When the two solvents are shaken vigorously in a separatory funnel (Fig. 4), the oily and waxy materials migrate to the petroleum ether and the pesticides remain in the acetonitrile. Next the pesticides are forced out of the acetonitrile into fresh petroleum ether by adding a large volume of water to the acetonitrile. The petroleum ether is put onto an adsorption column of Florisil (Figs. 5 & 6), a granular adsorbing material, which removes both the pesticide and the remaining impurities; the latter include much of the natural coloring material of plants. The pesticides then are washed or eluted from the Florisil with selective solvent mixtures and the impurities remain. The pesticides are now sufficiently pure for the current determinative step—gas chromatography (Fig. 7).

The determinative step has taken a number of forms in its evolution since 1944. The first procedure for a number of compounds was the "total chlorine" method. This consisted of burning the chemicals or otherwise liberating all the chlorine from the compounds, then measuring all the chlorine, then calculating the residue based on the known percent of chlorine in the pesticides. This procedure had some use until the more highly toxic compounds were introduced. FDA established very low tolerances, such as 0.1 or 0.2 parts per million or zero for these compounds.

The total chlorine method did not work for the low tolerance compounds because food products known to have had no treatment with organochlorine pesticides, and the reagents used in the analysis, contained small amounts of chlorine which, when calculated to pesticide, caused the food to appear to contain 0.1 - 0.3 ppm of pesticide. These values are called untreated blank values. When these 0.1 - 0.3 ppm values are low in relation to the amount of chemical expected—such as 7 ppm for DDT—they can be subtracted with little effect on the total. But when they equal or exceed the tolerance—such as 0.1 ppm dieldrin or zero endrin tolerance—the blank value invalidates the results for those compounds. No isolation (or cleanup) procedure was found that would substantially remove this blank value. Of equal importance to FDA, it was necessary for us to know which chemicals were present to make a valid calculation of amount.

Bioassay is another technique that was studied extensively by FDA and others. It was first used for DDT by E. P. Laug, an FDA chemist, in 1946. The technique consists of exposing certain organisms to varying amounts of the toxic chemicals under standardized conditions and noting the amount of chemical required to kill 50 percent of the test subjects. The amount of chemical that kills 50 percent of the test organisms is called the lethal dose 50 or LD_{50}. Then the same number of organisms under the same conditions are exposed to varying amounts of extracts from food products. The amount of extract which kills 50 percent of the test organisms is considered to have an amount of pesticide equivalent to that level of mortality. Various organisms have been used in tests with this method, such as houseflies, fruit flies, mosquito larvae, and brine shrimp.

The bioassay procedure had merit and was used to some extent but was found to have disadvantages upon close study. During the early use of the bioassay technique FDA had no established means of identifying the chemicals which might possibly be present in a residue extract from samples of unknown spray history. We attempted to interpret the mortality from a sample of unknown pesticide history in general terms—that is, toxicity equivalent to that for so much DDT. But this was of little value in tolerance enforcement activity because invariably the toxicity to the test organisms is different from the toxicity values for the higher animals that are used to establish tolerances. For instance, some common pesticides are 50 times more toxic to houseflies than others; an LD_{50} can be obtained from a small amount of lindane or a large amount of TDE, even though the general legal tolerances for lindane have been set somewhat higher than those for TDE. The bioassay technique was useful, however, where only one known pesticide was present, as in agricultural experimentation work.

Another serious problem arose because oily and waxy residues in the extract either killed the test organisms by suffocation or did not permit the pesticide to come into contact with the organism. Thus, the results obtained were either false positive or false negative.

During the years 1956-1959, in the application of the bioassay technique to analysis of pesticide residues in fluid market milk, P. A. Clifford and later he and P. A. Mills, both FDA chemists, found that dependable mortality was possible only after thorough isolation of the pesticide from the fatty components of milk. They also used a process called paper chromatogra-

phy in attempts to separate and identify the different chemicals present. Here again they found they needed to isolate the pesticide from fatty materials to obtain dependable identity.

In paper chromatography, a mixture of chemicals is placed on a piece of porous paper near the edge and the paper is barely dipped into a proper solvent, much like putting the edge of a blotter in a solvent. As the solvent is absorbed, it migrates up the paper by capillary action. As the solvent passes through the mixture of chemicals, the chemicals begin to migrate up the paper with the solvent, depending on their solubility. When the proper solvent or solvents are used, the piece of paper becomes a chromatogram in which the mixture of chemicals is separated into components as discrete spots. The process is quite effective in separating and isolating the compounds. The distance each component migrates in relation to the distance the solvent migrates is characteristic of each and thus the ratio can be used to help identify the compound. (This migration characteristic provides presumptive proof of identity. Other methods are used for definite identification.) Extracts that are impure yield chromatograms that are difficult to interpret. It became evident that when the compounds are well enough isolated for valid mortality measurements and identity, the quantity can be estimated from the paper nearly as well as from the bioassay. Thus, the bioassay was gradually eliminated and paper chromatograms were used for identity and quantitation.

Shortly after paper chromatography was established for this purpose, there was developed a somewhat similar technique called thin-layer chromatography. It is similar in principle, but the paper is replaced by a thin layer of adsorptive material on a glass plate backing. This has certain advantages over paper chromatography.

Gas chromatography, or more accurately, gas-liquid chromatography, entered the field about the same time as thin-layer chromatography. In most respects gas chromatography, properly used, is far superior for the determination phase and has become widely used.

Gas liquid chromatography (GLC) was developed during the 1950's and proved useful for many analytical purposes, but the early detectors were not useful for pesticide residue analysis for reasons we shall explain later. GLC equipment consists of a long tube of small diameter which is filled with an inert granular material called packing, at the end of which is the detector. This packing is coated with a small amount of nonvolatile liquid (the liquid phase of GLC). The packed tube is heated to a relatively high temperature and a carrier gas such as nitrogen is passed through the heated tube at a known rate. Then a small amount of the purified extract is injected by hypodermic needle onto the same end of the column as the gas enters and is vaporized into the carrier gas (the gas phase of GLC). As the heated gas passes over the heated liquid on the inert packing, the different chemicals pass through the column at a rate depending on their relative solubilities in the gas and liquid phases at the given temperature.

For GLC of pesticides, choices are made of temperature, type of gas, gas flow rate, type and amount of liquid, type and size of packing, and type of tubing material and its length and diameter. Selected combinations are chosen to attempt to completely separate the pesticides on the column so they emerge as discrete, pure compounds. It is essential that those nonvolatile impurities not removed from the extract during the isolation process remain at the entrance so that they do not react with the pesticide chemicals or deter them from emerging in their characteristic time.

After the chemicals emerge they must be detected and measured. The detector is an important part of the GLC system. The earlier detectors, called thermistors, responded to any chemical that emerged. Therefore, they were nonselective in response. But they were relatively low in sensitivity, so they did not respond to the very small amounts of pesticide chemicals available in pesticide residue analysis.

The first selective and highly sensitive detector found useful for pesticide residue analysis was devised in 1960 by D. Coulson and others of Stanford Research Institute. This detector—called a microcoulometer—continuously measures the amount of hydrochloric acid formed from the chlorine in the pesticide. After the chemicals pass through the column, they are burned in a furnace to form hydrochloric acid, which then passes onto the microcoulometer.

Those who worked with the microcoulometer hoped that the column would perform the isolation step of analysis and that the microcoulometer would perform the determination step. They soon found that difficulties arose when extracts not subjected to an isolation procedure were put into the column. These impure extracts cause some pesticides to be lost completely, and cause others to be converted to new compounds which chromatograph at different times than the parent, etc. The detector also becomes damaged and fails to respond properly. When so many anomalies arose with the addition of impure extracts, the FDA chemists tried extracts purified by the isolation process described above for bioassay and paper chromatography. These produced gas chromatographic results that were

far superior to uncleaned extracts.

Detection devices other than the microcoulometer later became available and were found useful for the organochlorine pesticides. One, called an electron capture detector, was found to be more sensitive than the microcoulometer to many compounds containing chlorine and it was considerably easier to maintain and operate. For most studies it has replaced the microcoulometer. But this detector, too, is subject to damage from impure extracts, and since it is used in conjunction with the same columns that are useful for microcoulometry, the need here for a good isolation process before gas chromatography is equally important. The electron capture detector is not as specific for compounds containing chlorine as is the microcoulometer. However, few of the compounds that capture electrons are extracted, isolated, or gas chromatographed. If there is a suspicious response it must be checked. Often the microcoulometric detector is used to prove the presence of a pesticide containing chlorine.

The electron-capture detector principle is incorporated in the design of a number of different detectors. Such devices have a radioactive element as a source of ions. Different radioactive elements are used in different detectors. FDA chemists studied the design and performance of a number of these detectors, including the geometric design and voltage needed, and chose those parameters which yielded best conditions for routine quantitative measurement in residue analysis. We incorporated the best design and operating parameters into the multiresidue method.

Some organophosphorus compounds capture electrons even when these compounds contain no chlorine. (The response is not due to the phosphorus.) The electron capture detectors are useful for these few organophosphorus compounds but not for all. In 1964, Mrs. L. Giuffrida of FDA's laboratories announced the discovery of a new device called a thermionic detector that is highly sensitive and highly selective for compounds containing phosphorus. Gas chromatography has been well worked out for the organophosphorus pesticide chemicals with use of the thermionic detector, but modification of the extraction and isolation procedures was necessary; this has required extensive experimentation. Many of the organophosphorus pesticides are water soluble or convert to water soluble compounds in the presence of light and plant and animal enzymes. Water soluble compounds are not as easily isolated from food products as the oil soluble compounds containing chlorine. We hope we can devise for full use fairly soon a multiresidue method for the important members of the organophosphorus group.

Many of the compounds containing sulfur are members of the organochlorine and organophosphorus groups. There also is available a detector that is sensitive to sulfur and thus fairly useful for sulfur compounds that do not fit into the other groups. Many pesticides contain sulfur and nitrogen and many of these are fungicides. The extraction and isolation steps for this group have not been developed, even though the sulfur detector is available.

The only available detector sensitive to nitrogen has not been perfected to a sensitivity and reliability sufficient to determine the pesticide compounds which contain nitrogen. There is a need for a good multiresidue method for the insecticidal carbamates and other pesticides which contain nitrogen alone as an important element.

The chemist has improvised and innovated to provide methods of analysis capable of yielding meaningful results for a large number of pesticide chemical residues. There is an urgent need for continued research on this type of methods development. Many chemicals do not fit into the methods described above. We must make efforts to incorporate them. Methods for the phosphorus and the nitrogen compounds must be perfected before a meaningful survey of the food supply can be made for those residues. New chemicals are being introduced regularly. We need research to find whether these compounds can be incorporated into the existing methods or whether these new compounds will interfere with determination of the older ones.

J. William Cook, Associate Director for Research, Division of Food Chemistry and Technology, Bureau of Science, joined FDA in 1939.

The multiresidue method for organochlorine compounds is useful for domestic edible animal tissues. We feel that it would provide a good basis to develop analytical methods for residues in animal species such as fish and other wildlife and other factors in our environment such as soil, water, and river muds. It should be as applicable to human tissues as to edible animal tissues. For the use of these methods in environmental studies some research would be necessary to help interpret results, because many industrial chemicals other than pesticides may be present and may interfere with identification of the pesticide chemical.

We have made much progress in the field of methods of analysis, but we need much more to continue to assure prompt and effective protection of the Nation's food from harmful amounts of pesticide residues.

THE NEW MASKED MAN IN AGRICULTURE

PESTICIDES AND THE HEALTH OF THE AGRICULTURAL USERS

By MARY K. FARINHOLT

Published and distributed by the
NATIONAL CONSUMERS
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FOREWORD

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Modern pesticides are useful in the production of our crops but they carry with them problems of health hazards to the persons who handle and spray them and who work in the fields.

In May 1961, the Board of Directors of the National Consumers Committee for Research and Education, Inc. voted to authorize a study of the health hazards of chemical pesticides to the user in agriculture and to inform the public of the safety precautions deemed necessary to protect the workers.

Mrs. Mary K. Farinholt was asked to compile as much available information as possible and to write a non-technical pamphlet suitable for general distribution. In developing the subject, Mrs. Farinholt did not rely wholly on published material but sought first hand information through letters and personal interviews with members of the Federal and State governmental departments, research laboratories and chemical concerns, farm groups, universities, scientists and physicians. Scores of persons have aided in clarifying difficult points and responding to requests for specific information. We wish especially to express our appreciation to the staff in the California Departments of Public Health and Agriculture and at the University of California in Riverside. We are equally grateful to the members of the various Federal agencies — the U. S. Public Health Service, the Food and Drug Administration, the Bureau of Labor Standards, the Pesticides Regulation Division and the Agricultural Extension Service of the Department of Agriculture, and the President's Committee on Migratory Labor — who gave generously of their time and knowledge to the study.

In her conclusions, Mrs. Farinholt points out that there is no one single remedy to ensure safety in the use of chemical pesticides. Various methods are used, such as Read-the-Label campaigns, instruction classes in safe practices, safety regulations, medical supervision, the development of less toxic pesticides, and finally, the long-range plan of integrated control of pests harmful to the crops.

A series of questions to stimulate thought and point to possible solutions of health problems and a selected bibliography will aid the reader who wishes to further explore the subject.

It is our hope that this pamphlet will encourage more extensive use of safety precautions and that it will help to secure more effective cooperation between Federal and State governments, industry, agriculture, public health, physicians, health educators, and Extension personnel. If the publication of this study helps to reduce the health hazards to man in the use of modern pesticides through a better informed public understanding of the problems, our effort will be abundantly justified.

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This study was made possible through the donors of the Elizabeth S. Magee Testimonial Fund and the special gifts of Mrs. Arthur E. Barnard and Mr. Hyman Schroeder.

We are indebted to the Bureau of Labor Standards of the United States Department of Labor for the photograph on the cover.

SUSANNA P. ZWEMER, *Secretary*
National Consumers Committee for
Research and Education, Inc.

September 1962

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In face mask, goggles, gloves, and boots, the man you see on a U. S. farm sometimes looks like a space-man. Why the weird costume? For spraying crops safely with today's chemical pesticides, a farm worker needs special clothes. He needs special knowledge and methods too.

Many vocal citizens have questioned about pesticides on behalf of consumers, fish, black footed ferrets and lesser prairie chickens, but few on behalf of farmers and farm workers. In this study therefore, we are assessing the health hazards of pesticides to the men who apply them in agriculture.

MARY K. FARINHOLT

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THE NEW MASKED MAN IN AGRICULTURE

Pesticides and the Health of the Agricultural Users

By Mary K. Farinholt

WHAT ARE PESTICIDES?

Agricultural pesticides are used to control insects, diseases, weeds, and rodents harmful to crops. In 1961, over 500 million pounds of pesticides worth $300 million were sold by U. S. companies. There are approximately 94,000 brand-name registered pesticides on the market. Production figures have been rising steadily since 1947. About half of present production is insecticides.

Pesticides as an agricultural tool are a century old. Around 1850, sulfur and bordeaux mixture were used systematically against mildew on grapes, and paris green against the Colorado potato beetle. As other arsenicals related to paris green were found to protect crops, pesticide use increased. At the end of World War II, the whole pattern of agricultural use of pesticides was altered by the introduction of DDT and other chemical products of war research. These were fast followed into the market by scores of other pest control compounds.

The new "economic poisons" available since 1945 have been used in a new widespread way: on crops, pastures, meadows, and forests, where before pests were not considered controllable. Along with mechanization, they are now a regular mainstay in the modern U. S. farmer's effort to get more yield with less manpower. Many post-1945 pesticides have new properties and new hazards of which most of us are not aware.

Chemical pesticides are here to stay. An increasing population will require more food from a static or shrinking farm acreage. Besides the sheer quantity of food U. S. consumers demand, the quality they expect includes diversity and lack of blemish, infestation and decay. Furthermore, the big capital invested in the big business of farming today will not tolerate gambling on possible crop loss, when a preventive is at hand. Without chemical pesticides, according to a National Academy of Sciences subcommittee, many fruits and vegetables would disappear from the market, and many other crops would grow so meagerly they would be marketable only as rare luxuries. Apples, tomatoes, and corn show how pests threaten stable supply and safe investment. Apples can be attacked by 100 insects and 100 diseases, about 20 of which are sure to endanger unsprayed fruit. In 1946, one-half the tomato crop in 10 states was destroyed by fungi. In 1940-45, corn production was abandoned in many areas because of the sweeping devastation of the European corn borer. This sort of destruction can now be prevented.

Still, informed estimates suggest that, despite present efforts, one-fifth of U. S. crops are lost yearly because of pests. All factors point to an intensified fight against crop pests in the future.

EFFECTS ON HUMANS

Some Case Histories

While marvelously improving crop production in recent years, pesticides have also created another kind of news in agriculture:

In Massachusetts in 1959, two Puerto Rican farm workers were dusting turnips with insecticides. "They worked in jeans or khaki pants, short-sleeved shirts, and different types of shoes. If they got thirsty along one of the rows, they stopped dusting and had a drink of milk from their lunch pails, or perhaps a 'coke.' On Friday of the week during which they were working on the turnips it was particularly hot and humid and about 5 p. m., the two men complained of feeling sick. By the time they could be admitted to a nearby hospital and receive treatment (the foreman told the doctor they had been using parathion), it was 7 p. m. In spite of hospitalization and atropine therapy, however, one man died at 9:15 p. m. and the other at 10:10 p. m."[1]

"A six-year-old boy found a gallon jug of 40% TEPP concentrate which had been abandoned in an orchard near his home. In the course of trying to open it he spilled some on his legs. By the time he got home he was in a state of collapse. Without knowing what was wrong with him his father rushed him to the doctor but the boy stopped breathing en route and the resultant lack of oxygen so damaged the brain that the boy died six days later without being able to breathe naturally again."[2]

"A truck driver used to transporting and handling organic phosphates, to carefully wear protective clothing, and to wash carefully after each exposure, spilled a couple of ounces of Systox (demeton) on his trousers one morning. Knowing that it would be rapidly absorbed through the skin, he washed the spot out with a rag and water. Apparently in a hurry, he continued to wear the same trousers. By late afternoon he was hospitalized in a critical condition, exhibiting signs of severe organic phosphate poisoning."[3]

"In a recent case, a child suffered a sudden seizure and was brought quickly to a hospital where he was found to be limp, unresponsive, and slightly cyanotic. The pupils were widely dilated and the pulse 'very slow' . . . total absence of reflexes . . . The child's tolerance for moderate doses of atropine without atropinization and the fact that his father was a spray pilot aroused suspicion that the youngster might be poisoned by an organic phosphorus insecticide . . . It turned out the child . . . had eaten dirt contaminated by parathion. It was established that spillage of the parathion had occurred more than 6 months earlier. Soil from the place where the child had dug still contained nearly 1% of parathion."[4]

In Florida in 1957, organic phosphate poisoning killed the operator of a private spraying business. "He was apparently exposed over a long period and complained of sickness for some time prior to hospitalization and death."[5]

"Thimet made news during March and April of 1959 when 25 farm laborers who were planting cotton in the San Joaquin Valley were suddenly taken ill. Signs and symptoms ranged from nausea, dizziness and headaches, to blurring of vision and coma. The men who became ill were exposed while loading and unloading the bags of Thimet-treated seeds from trucks, loading the planters, piling the empty bags, and finally burning them. Thimet, like other organic phosphate pesticides, may enter the body directly through the skin as well as by inhalation and swallowing."[6]

Statistics Scarce on Pesticide Injuries

It is impossible to know how many such illnesses and deaths have occurred, and are occurring in the U. S. — and in U. S. agriculture, in particular — because of the use of pesticides. Uniform reliable statistics do not exist. Most States have no system for reporting or recording injuries attributable to pesticides. Dr. Bernard C. Conley, Secretary of the Committee on Pesticides and the Committee on Toxicology of the American Medical Association, has stated:

"The incidence of injury from pesticides has been extremely difficult to determine. Statistical data on nonfatal and fatal poisoning have been scanty and misleading, and this has contributed to the misconception that pesticide injuries are infrequent or rare."[7]

"California is the only State which annually publishes a detailed tabulation of nonfatal injury from economic poisons."[8]

Expert *estimates* have been made, and an up-to-date one asserts that approximately 166 deaths from pesticides occurred in the U. S. in 1959. It is often assumed in such educated guessing that there probably are 100 times as many nonfatal injuries as fatal. California alone, in the year 1959, reported 1093 pesticide injuries — 3 fatalities — among the 80% of employed workers in the State covered by workmen's compensation records. California health officials are concerned because, though their number of agricultural workers has decreased in recent years, the trend of pesticide injuries in their State is increasing.[9] In Florida, there has been a "slowly rising number of deaths from pesticides," as pesticide manufacturers themselves have recognized.[10]

Many other States assume they have no health problem from pesticides, or that the problem is under control. Yet their complacency often has frail foundations:[11]

"The reporting of poisoning cases is not a requirement of public health laws, so we do not know the incidence of this problem. Deaths, of course, must be reported, but any specific agent would be tabulated under a general category such as deaths resulting from accidents, poisoning, and violence. [We] did have two, or possibly three, deaths about two years ago from parathion which were brought to our attention."

"Morbidity from pesticides is not officially reportable in this State. Of course where deaths occur death certificates are sent into this office."

"Since illness due to chemical poisoning is not a required reportable disease in this state, our Division of Vital Statistics has no such records."

"Employees in the agricultural industry are not within the jurisdiction of this Department and upon inquiry, I find very little information concerning injuries by pesticides in our state. It is believed these cases are more or less handled by the county health officers."

States which report poisoning cases to the Federal government's Clearinghouse for Poison Control Centers suggest the Clearinghouse as the best source of information. But the Clearinghouse itself notes that "only about one-half of the centers report to the National Clearinghouse. Also it is questionable how many agricultural poisonings would be reported to centers."[12]

A state workmen's compensation system requires occupational accident and disease reports which would give substantial information on the incidence of pesticide injuries in agriculture, at least for those not self-employed. In fact, such records are the source of California's uniquely detailed reports. However, only seven States cover agricultural workers in the same way as other workers.[13]

Many officials of the U. S. Department of Agriculture and the Public Health Service believe that reports of deaths are reliable enough for them to know the general range of pesticide fatalities and that these are close to an unavoidable minimum. However, no one can presume to know the scope of less-than-fatal injuries attributable to pesticides.

A Menace to Health? What the Experts Say

Can pesticide use be a real menace to the health of farmers and farm workers without our seeing a heavy accumulation of case histories or a clear national toll of pesticide casualties?

The World Health Organization devotes constant expert attention to studying pesticide use, because of its massive effort to control insect-borne diseases such as malaria. In an intensive report in 1956 "Toxic Hazards of Pesticides to Man," a WHO Study Group pointed out that: "Groups which deserve study because of their extended exposure include workers in formulating plants [where the basic chemicals are combined with other ingredients to form the brand-name products used on farm, lawn, and garden], workers on antimalaria spray teams, and workers engaged in certain agricultural pursuits." Presumably, the special vulnerability of agricultural workers would include those who mix and prepare sprays, those who do ground-level spraying from tractor or truck, those who do aerial spraying of large tracts, and those harvesting crops where poisonous residues are present; since the specially risky stages in any pesticide operation, according to WHO, are in transferring the pesticide from bulk to smaller containers, in mixing the spray, in exposure to droplets while spraying, and of course any accidental contamination (such as occurs by spills or leaks, using faulty respirator masks, flying through spray mist, or working among foliage where heavy residues persist).

"While there is comparatively little difficulty in assembling reports of casualties that are published in the medical and scientific literature, it must be recognized that many accidental cases of poisoning are never reported. Many factors may contribute to the failure of such cases to reach the published literature." . . . "The Study Group recognizes the fact that pesticides present considerable toxic hazards in agriculture."[14]

In 1960, Mr. Homer R. Wolfe of the Wenatchee Field Station, U. S. Public Health Service, pointed out that the ability of parathion residues on foliage to poison crop workers has not been generally appreciated.

Careful investigation of eleven episodes of parathion residue poisoning disclosed that "of 142 persons exposed, 75 became ill. These mild poisonings occurred in workers thinning, picking, or irrigating crops of apples, pears, grapes, oranges, and hops treated with one or more pounds of parathion per acre. Several of the known instances of poisoning involved exposure to foliage or fruit sprayed not more than two days earlier. However, contact with pear trees, grape vines, and orange trees caused poisoning as much as 12, 33, and 34 days, respectively, after application. Since the reporting [in 1958] of this clinical and occupational type of parathion poisoning, there have been found many more such outbreaks involving hundreds of workers."[15]

Scientists of the U. S. Public Health Service at Wenatchee also checked on "a rather large number of illnesses allegedly due to pesticides in central Washington" among persons spraying crops there in 1958.

"These cases included two fatalities and approximately 100 illnesses ranging in severity from very mild (with no time lost from work) to serious (involving several days of hospitalization). In 71 of the 100 cases, it was considered that an etiology of pesticide poisoning was established by exposure history, clinical symptoms, and/or laboratory tests. Most of the poisoning cases involved parathion, the most widely used of the more toxic pesticides in this area. However, demeton (Systox) and Phosdrin were also involved . . . The incidence of poisoning was somewhat lower during 1959."[16]

Dr. Clyde Berry, Associate Director of the Institute of Agricultural Medicine at the State University of Iowa says there are several logical explanations for the dearth of case reports:

"1. Farmers are not being made ill.

2. They are being made ill, but are not seeing physicians.

3. They are being made ill and are seeing physicians, but the causes of illness are not being diagnosed.

4. They are being made ill, they are seeing physicians and the etiologies are being diagnosed, but case reports are not being published in the medical literature.

It seems likely that the answer lies in the latter three of these possibilities."[17]

Mr. Henry N. Doyle of the Occupational Health Program, U. S. Public Health Service, in discussing the vulnerability of agricultural people to health hazards from toxic chemicals, contrasted the conditions of industrial and agricultural work:

> "Industrial operations are usually performed in a fixed location where exhaust ventilation or other suitable control methods are feasible. Industry has been subjected to fairly extensive and intensive educational programs on health and safety for at least a generation. Large companies usually have full-time safety and medical departments alert to potential dangers. Furthermore, personnel of insurance carriers and official agencies make frequent visits to industrial plants to check for possible hazards. On the other hand, agricultural workers generally have little idea of the hazards of handling and applying powerful chemicals. Although most chemicals of this type carry warnings on the container labels, the tendency is to pay little or no attention to the labels, particularly if a material has been used previously without untoward incident. Moreover, the methods of application are almost as varied as the materials used. Many of these methods present dangers that would not be tolerated in manufacturing establishments."[18]

Aside from the devastating cases of systemic poisoning, there is the more common and constant danger of skin irritation and severe dermatitis from exposure to pesticides. Dr. Louis Schwartz, specialist in occupational dermatology, has devoted one article entirely to the problem of skin hazards to farmers, florists, and cattle breeders from fertilizers and pesticides.[19]

In its 1960-61 Annual Report, the Department of Public Health of the Province of Saskatchewan, Canada, asserted that "the hazard associated with the use of a wide variety of chemicals on the farm is very real and increasing year by year." Dr. N. Williams, Director of the Department's Occupational Health Branch, said, "I am sure that there are very many cases of minor illness associated with the use of agricultural chemicals, but many farmers will not consider their symptoms serious enough to consult a physician, and even if they do the cause of the non-specific symptoms may not be recognized by the physician."[20]

After eight years of experience with post-war pesticides, the British Government in 1952, found it necessary to adopt stringent Regulations controlling the use of the more toxic pesticides for the protection of agricultural workers. In the U. S., there is no Federal regulation of the manner of pesticide use. Only five States attempt an indirect influence for safe use by requiring all users to get permits or licenses.

In California, the danger to agricultural people from present usage of toxic chemicals is clearly recognized. The California Department of Public Health states with real anxiety that they had 975 occupational disease reports attributed to pesticides and other agricultural chemicals in 1960 — 60% of which refer to farm workers. Their reports do not include self-employed farmers so there is no way to know the rate of pesticide illness among them. In California, they find that both commercial applicators and farmer applicators of pesticides use

farm workers in spray operations. Some of the people involved become ill. Others working on farms receive their exposure while harvesting or irrigating the crops.[21]

Officials of the Florida State Board of Health are also concerned about their State's pesticide disease rate. They have expressed the opinion that "Farm workers and their children are involved more than any other group, from the standpoint of being poisoned by highly toxic pesticides . . . Children have been sprayed in their yards adjacent to orange groves."[22]

Can we reasonably believe that only California and Florida in the United States, and the rest of the world, have experienced shocking casualties from widespread uncontrolled use of highly toxic pesticides in agriculture?

Many officials are completely reassured because U. S. pesticide casualties are apparently less significant than in other countries such as India, and we would expect this to be so because of our solid experience with industrial safety and the technical maturity of most of our farmers. But officialdom and the pesticide industry should be restless about health risks from pesticides as long as they can not provide real answers to two questions:

(1) How many illnesses and deaths occur in the United States each year because of pesticides?

(2) Is the casualty rate close to the irreducible minimum of accidents which no reasonable public policy could prevent?

It seems probable that there is unnecessary suffering and wasted health among people in agriculture in view of their exposure, known casualty cases, general ignorance of the properties of new pesticides and necessary precautions, unrestricted sale of extremely toxic chemicals to any user except in a few States which require licenses, and lack of regulation or inspection to enforce safe use. Considering all these circumstances, the opinion of many State officials that they have no new health problem in agriculture *because they have no records on the subject,* is not reassuring. It is highly disturbing.

Toxicity of the New Pesticides

For years, toxic pesticides have been used such as cyanides, arsenicals, strychnine, nicotine. The public and the medical profession are by now well aware of their hazard. The continuous introduction since World War II of powerful new pesticides offers new threats to health because they are more commonly used, bringing a large population into contact with them; many of them are highly toxic to humans; they may enter the body by many routes, *through the skin* as well as by swallowing or breathing; their threat to the body may gradually accumulate so that a minor final exposure can be enough to produce severe illness; their damage is diverse and hard to diagnose, ranging from chronic minor irritations (including skin disorders) to fatal poisoning.

Among the new pesticides, their *toxicity,* or ability to injure, varies widely. It is some source of confusion, for example, that among the powerful organic

phosphate insecticides, parathion is so toxic it should never be used by home gardeners or any non-expert, while malathion is generally promoted through every local hardware store as one of the safest to handle.

Health Hazards

It is even more confusing to the non-expert handler of a pesticide that the *hazard,* the actual probability that you will be endangered if you apply a particular chemical, also varies widely. The weather affects your chances of pesticide illness. Poisonings occur more often in very hot humid weather.

Insecticides are marketed as dusting powders, water-dispersible powder concentrates, oil emulsion concentrates, water or oil solutions. The solvents and other carriers used with the insecticidal chemical itself, are often poisonous to humans and may also be skin irritants. DDT in *powder* form is safe enough for doctors to put into certain open wounds, but DDT *sprays* of higher than 0.5% concentration require precautions against skin contamination.[23] Applying lindane may not be risky in a hayfield, but to do it by aerosol in a greenhouse, as shown on the cover, you need a full-face gas mask. To handle malathion spray, you may not need protective clothing — unless you have recently been exposed to EPN. Dusting with Sevin can be relatively safe, but a man who is continually opening bags of Sevin, or loading it into applicator airplanes, needs a respirator.

Over large tracts, airplanes are used to spread insecticides, herbicides, defoliants, fungicides, fertilizers. The pilots may dispense either a spray or a dust or a fog. The U. S. Department of Agriculture, in a guide for air-sprayers, warns them of a "bewildering variety of spraying equipment" produced for them.[24] The design of airplane, of chemical tank, of discharge pump or gravity-feed system they use can decide the pilot's and ground flagman's degree of exposure to pesticide illness.

Men applying pesticides on the ground may be using an aerosol, a compression sprayer, a stirrup-pump sprayer, a hand-plunger duster, a fogging or misting machine. Some types of equipment and some brands of equipment are of course safer than others.

Using a form or concentration or application method that is wrong for his work conditions, can erase a farm worker's margin of safety.

Insecticides — Chlorinated Hydrocarbons

The most famous of the chlorinated hydrocarbon insecticides is DDT. But also in general use are chlordane, BHC, lindane, dieldrin, aldrin, endrin, methoxychlor, toxaphene, heptachlor, etc. Of all the new economic poisons, DDT is the most studied and the best understood. DDT had great resources of wartime research focused upon its development. Its effectiveness against a wide range of pests made it magically attractive for a huge market; agricultural users, householders, and the United Nations' attack on disease-carrying pests.

It is known that, in varying degrees, chlorinated hydrocarbons affect the central nervous system, "but the exact mechanism of this action either in man or in animals has not been elucidated."[25] Exposure can be by swallowing, breathing, or skin contact. Body effects are cumulative; a large dose or repeated small doses can be equally damaging. When taken into an animal's body, they are stored in its fat. Mild poisoning may show itself by headache, fever, nervousness, excessive blinking, cold skin, loss of appetite. Severe poisoning can bring vomiting, diarrhea, convulsions preceding death. Permanent liver and kidney damage have been observed in animals and are considered possible in humans. DDT, of relatively low toxicity itself, can cause dermatitis, and the solvents used in DDT sprays can cause dermatitis and poisoning symptoms.

Chlordane is now an ingredient in many popular insecticides. It is forcibly marked by Dr. Frederick D. Malkinson of the Department of Medicine of the University of Chicago, as "perhaps the most potent and dangerous insecticide in the group of chlorinated hydrocarbon compounds . . . it penetrates the skin with great ease." In an article in the A.M.A. Archives of Industrial Health, Dr. Malkinson particularly refers to the death of an industrial worker from spillage of chlordane on his clothes, and several deaths at home and among agricultural workers from skin absorption alone or in combination with respiratory absorption.[23]

On the other hand, carbon tetrachloride, an insecticide used mainly to fumigate stored grain, is not so important a threat to the body when it enters through the skin but is most dangerous to inhale. Large amounts of it inhaled have been known to cause death in one to fifteen minutes. Yet, a U. S. Public Health Service officer was horrified to notice in a farm survey report that workers were observed merely "tying handkerchiefs over their faces to protect themselves from heavy concentrations of carbon tetrachloride."[18]

Insecticides — Organic Phosphates

The organic phosphate insecticides include some of the most toxic agricultural chemicals commercially available: TEPP, HETP, demeton (Systox), parathion, schradan (OMPA), EPN. Dramatic cases have been recorded of injury to children finding "empty" containers, or workers handling these pesticides without knowledge of their unexpected properties. Their consequent notoriety should have scared off everyone from careless or unawed use. However, there is among this chemical class great variation in toxicity to humans and in how the different compounds react within the human body. Dipterex and chlorthion are not nearly of the same order of menace as those we have just mentioned. And malathion is conspicuous among effective wide-range insecticides for its relatively low toxicity to man.

The organic phosphates attack the body mainly by interfering with the action of the enzyme cholinesterase in the nervous system. This enzyme normally prevents the accumulation of acetylcholine which makes the muscles respond in their characteristic ways to various nerve impulses. When cholinesterase is prevented by an organic phosphate from converting acetylcholine and thus terminating the body's responses to nerve stimuli, a terrible uncontrolled clamor mangles all the body's functions.

One can be exposed by swallowing, breathing, or skin contact. Entry through the skin is, in fact, the principal danger from organic phosphates. The effects of parathion can accumulate in the body for weeks, so that repeated small exposures as well as single massive ones can be dangerous.

Early signs of organic phosphate poisoning can be general and deceptively mild: headache, nausea, weakness, and fatigue; giddiness, anxiety, and restlessness. If the eyes have been in contact with spray, there may be eye pain and constriction of the pupils. (Spray pilots are, of course, especially endangered when they experience eye symptoms.) When the illness is allowed to make its appalling progress, vomiting, diarrhea, increased respiratory rate with a feeling of tightness in the chest, uncontrollable muscular twitching, sweating, tearing, salivation, defecation, urination, develop. In advanced cases, convulsions, coma, loss of reflexes, follow. Death is caused apparently by respiratory failure. Severe cases have been saved by prompt diagnosis and treatment, but speed is essential because heavy exposure can bring death in ½ to 4 hours.

In a 1960 book-length study of the chemical, biochemical, and physiological properties of the organic phosphate compounds, Dr. Richard D. O'Brien of Cornell University tells about their most furtive quality, first noticed in laboratories only a few years ago.[26]

> "In 1956, it was reported that FDA scientists had found certain combinations of organophosphates to be more toxic than one would expect on the assumption of additive effects. The pair of compounds mentioned in this first anonymous article was malathion and EPN."

In 1957, FDA workers reported that in acute oral studies on rats, 50% were killed by about 1/10 LD50 each of malathion and EPN in combination. One LD50 is the amount of the material that kills 50% of the animals under usual test conditions. In dogs, all were killed by less than 1/40 LD50 malathion in combination with less than 1/50 LD50 of EPN. FDA subacute feeding studies showed greater than simply additive effect upon blood cholinesterase of rats and dogs.

This unpredictable build-up called "synergism" was observed in all paired combinations in acute oral doses to mice of EPN, malathion, dimefox, Phostex. "Once again the most marked effect was found with EPN and malathion." Apparently, one reason for malathion's low toxicity to warm-blooded animals is that, on entering the body it is chemically altered by protective action of the liver. This process is hampered in the presence of many other organic phosphates, such as Thimet and methyl parathion; and the process is completely stalled by parathion.[26] Since synergistic effects of organic phosphate combinations have only been detailed in laboratory reports on animals, the U. S. pesticide industry may still consider them mere armchair theory. But Dr. O'Brien refers to this observed synergism, or "potentiation," as a serious problem, "when two compounds that are innocent separately may together cause death."[27]

There is much uncertainty still about which new compounds may thus have their toxicity enormously multiplied by practical use together. Little is yet known about the accumulation of most of the new compounds in the body, except in the case of DDT, and even its *ultimate effects* are not known because humans have been absorbing it only since World War II. Information is completely inadequate on the types and the incidence of chronic illnesses that may

be caused by pesticides, injuries that are not fatal but are prolonged. Perhaps for all these reasons, the British Government, in an official summary of its agricultural poisons regulations, states:[28]

"(a) The repeated use of chemicals, even in small quantities, can have cumulative effects which may not be noticed until a dangerous amount has been absorbed. This applies particularly to chemicals in the organo-phosphorus group. Some of these — like diazinon, 'Dipterex,' malathion and 'Rogor' — are not dangerous enough under normal conditions to be specified in the Regulations, but if absorbed by a man who has worked with specified phosphorus substances they could increase the accumulation of poison in his body — perhaps to a most serious degree . . .

(b) A worker known to have been poisoned by a chemical, and who has been advised not to work with it until he recovers, must not work with any chemical in the same group whether it is specified in the Regulations or not.

(c) Although each group of chemicals acts on the body in different ways, it is undesirable on general grounds for a worker who has been removed from contact with a chemical in a particular group on medical grounds to be transferred to work with another chemical in a different group, e.g., a worker removed from contact with a dinitro compound should not be transferred to work with an organo-phosphorus compound or vice versa."

Herbicides — Halogenated Organic Acid Compounds

Halogenated organic acid compounds, used as selective herbicides to erase unwanted plants and leave the desired grass or crop unharmed, are best known because of the popularity of 2,4-D. 2,4-D has been assumed to have no danger for animals or man. However, an article in the A.M.A. Archives of Environmental Health of January 1962 reports that 2,4-D has apparently produced motor disorders, paralyses in extremities, vomiting and diarrhea in experimental animals. The scientists making the observations also noted three patients who had apparently experienced damage to the central nervous system from skin absorption of the herbicide. They suggest caution in the use of 2,4-D, and that "special neurological examination of workmen in contact with 2,4-D is necessary."[29]

Dinitrophenols

Eradicant herbicides destroy all the vegetation in an area. The dinitrophenols, typified by DNOC, are used often for this purpose. But in different form, DNOC and the others are also used as fungicides, insecticides, miticides, blossom-thinners in orchards. They can cause dermatitis. All the dinitros are dangerous to inhale or swallow, and DNOC and some others of the group can also be absorbed through the skin. Chronic DNOC poisoning is evidenced by fatigue, headaches, sweating, thirst; cataract formation may follow. An acute

illness in man brings nausea, restlessness, sweating, fever, rapid respiration, cyanosis and collapse. If death occurs it usually is within 24-28 hours. Yellow staining of the conjunctivae, and in severe exposures, of the organs, tissues, and fluids of the entire body, are characteristic of DNOC. Also characteristic is the slow, insidious pattern of recorded cases of poisoning — so unlike the immediate prostrating blow following exposure to TEPP or parathion. DNOC has been regarded as a menacing cause of casualties abroad, but in this country is considered relatively safe, whether because of differences in formulations used here, or in luck, or in case-reporting, or because "the symptoms of poisoning from substituted dinitrophenols resemble those of hyperthyroidism rather closely,"[30] is not entirely clear.

Carbamates

To counteract some plant diseases, chemical fungicides are applied to plants or to seeds. The carbamates are rated among the less hazardous agricultural chemicals to use: Ferbam, Zineb, Nabam, etc. However, much remains to be learned about them. Their health risks have so far been observed as "mild dermatitis, pharyngitis, rhinitis, bronchitis and conjunctivitis" as a result of rather heavy exposure.[31] A recently developed carbamate insecticide, Sevin, is reported to have relatively low toxicity for the user. Though a cholinesterase inhibitor, its developers state that it possesses "greater anticholinesterase activity against insects than against mammals."[32]

Fungicides — Organic Mercury Compounds

Organic mercury fungicides can cause severe poisoning. Dr. Wayland J. Hayes, Jr. of the U. S. Public Health Service, an internationally eminent toxicologist who concentrates on pesticide research, issued a warning in a July 1961 article that the organic mercury compounds are now available in this country "and their action should be familiar to physicians who treat farmers and others concerned with the use of agricultural chemicals." Early poisoning signs include tremors of the hands, loss of side vision, incoordination in speech and gait, irritability and headache. "Symptoms may follow relatively slight exposure and may appear as much as several weeks after exposure has ceased."[33]

Rodenticides

Of the rodenticides, the long-used thallium and arsenic compounds are, as is well known, terribly hazardous when swallowed and also somewhat dangerous through skin contact. Of the newer rodenticides, warfarin and ANTU are considered safe.

One pesticide about whose ferocity there is no disagreement or quibbling, is sodium fluoroacetate (1080) — "probably the most hazardous rodenticide available."[34] Its sale is restricted by industry; and the USDA, Public Health Service, and pest control specialists agree that it should be used minimally, with the most cautious conditions, and by experts only.

Difficulty of Diagnosis

The possible relationship between pesticides and blood diseases remains an open question. According to Dr. Hayes, broad assertions that pesticides have brought an increase in blood dyscrasias are unfounded:

> ". . . the trends of incidence of the blood dyscrasias have not increased; however, this does not establish that pesticides are not the cause in individual cases. It is certainly agreed that chemicals, especially drugs, can be the cause of individual cases. It is also generally recognized that no really satisfactory diagnostic test is available for establishing the relationship between a particular chemical and a particular case of blood dyscrasia. I would like to make a plea for basic research in this field . . ."[35]

The dimness surrounding the question of pesticides' effect on the blood is only one aspect of the difficulties of diagnosing agricultural chemical injuries. Dr. Hayes describes some of these:

> "Sometimes the patient, or those who accompany an unconscious patient, are simply unaware of an exposure which has occurred; or they may be aware of an exposure but completely uninformed about its significance" . . . "Information on the older pesticides usually adequate to permit diagnosis of poisoning by them is easily available . . . Information on the newer pesticides is somewhat less available."[4]

The basic U. S. medical guide for pesticides, which is prepared by the Communicable Disease Center at Atlanta, Georgia, states:

> "In the absence of laboratory facilities for cholinesterase determinations, poisoning by these [organic phosphorus] compounds has been confused with heat stroke, heat exhaustion, gastroenteritis, and pneumonia or other severe respiratory infection. Mild poisoning must frequently be distinguished from asthma and from simple fright with various psychosomatic manifestations, particularly among the associates of known poisoning cases."[36]

Laboratory measurement of blood cholinesterase activity is the best indicator for organic phosphorus poisoning. But, Dr. Hayes warns, many doctors and laboratory personnel are unaware of the difficulties of interpretation. Normal healthy enzymatic activity can vary greatly between individuals, and even in the same individual over time. So really, only when a person's usual cholinesterase level in times of health is known, can his level after exposure be a completely reliable diagnostic aid.

There are also particular handicaps in diagnosing chlorinated hydrocarbon poisonings:

> "Nervous symptoms and convulsions entirely similar to those of chlorinated hydrocarbon insecticide poisoning may be induced by a variety of economic poisons as well as by even less specific neurologic disease."[37]

Furthermore, in attempting laboratory analysis of the poison in tissues and urine, medical people must realize that exposure by repeated small doses will have allowed time for these chemicals' peculiar biological feat of storage in the body fat, leaving little evidence in other tissues, blood, and urine.

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The confusing resemblance of dinitrophenol poisoning to hyperthyroidism has already been mentioned.

A specific antidote for organic phosphorus poisoning has been successful even in advanced cases — large doses of atropine given for 24-48 hours. Oxygen may be required for severe cases of either organic phosphorus or dinitrophenol poisoning. In all cases where there has been dermal exposure, the poison must be removed from the skin (sometimes by an attendant wearing rubber gloves for his own protection).

Attempting self diagnosis and self treatment can be very dangerous, especially in the case of atropine taken without immediate follow-up and observation by a physician because the atropine may mask important symptoms of poisoning by organic phosphates. It seems likely that an occasional needless death has resulted from self treatment with atropine with such striking success that the patient continued his exposure and when the effects of atropine finally wore off the patient died before he could get to a doctor.

Precautions

What precautions can a man take to protect himself against pesticides he is working with? All the pesticides are poisonous to some degree, and should be handled carefully according to directions.

> "It is not generally realized that, while spraying, workers undergo a continual exposure to imperceptible spray droplets. This is true even when there is no visible mist behind the spray nozzle and no visible wetting of the skin or clothing of the worker. In a similar way, when dust formulations are used, there is some exposure even when no cloud of dust is seen."[38]

A worker should be told the risks of the chemical he is handling. Special work clothing should be worn including hat and gloves, left at the end of the workday and washed frequently. The hands and face should be washed before eating or smoking to prevent swallowing or inhaling the chemical. These general rules are guides for safely using the less toxic pesticides — DDT, malathion, Sevin, etc., according to the USDA, "provided they are in dilute dusts or water sprays. However most concentrates and oil solutions require special precautions."[39]

In handling the latter, and the more toxic compounds such as toxaphene and dieldrin, a worker is advised against spilling them or getting them into eyes, nose, or mouth. He should be provided with protective clothing which closes at wrists and throat, and gauntlet gloves (rubber or neoprene for phosphates' use). Care must be taken not to put hands already contaminated with chemical into gloves. If any pesticide is spilled on the body or clothing, clothing must be changed immediately, and skin or eyes thoroughly washed. Work period should be carefully limited to an 8-hour day for men who will be using chemicals over a prolonged period. First aid and treatment facilities should be available in case of toxic injuries. Daily bathing after work is necessary.

When preparing solutions, it is helpful to remember to use deep containers and long-handled mixers and dippers. Sprayers need to wash hands frequently; after refilling equipment, before eating or smoking, at the end of

work. They have to resist sucking or blowing through clogged nozzles of spray equipment, and try to avoid, as much as possible, moving through spray — if outdoors, or having drafts blow spray onto them — if indoors.

To use TEPP, parathion, and other pesticides that are the most toxic available, workers need not only the protective clothing, handy washing facilities and change of clothes, medical facilities available for emergencies, already advised for the milder chemicals — but also respirators or gas masks. Respirators are half-face masks protecting the mouth and nose but not the eyes. They have small filtering and absorption capacity, and are useful only against dusts, mists, and low-concentration vapors.

Of course, relying on faulty respirators is more dangerous than having none, so the USDA issues lists of tested and approved brands of respiratory devices. The listing is complicated, since a single respirator can not suffice for every pesticide. Those that protect against parathion may not protect against TEPP, and the respirator that serves adequately against low concentrations may not serve against high concentrations.

Farm workers with pesticides should also know that respirators require as much care as a well-tended baby:

"1. Change filters twice a day, or oftener, should breathing become difficult.

2. Change cartridges after 8 hours of actual use, or oftener, if any odor of the pesticide is detected.

3. Remove filters and cartridges and wash face piece with soap and warm water after use. After washing, rinse thoroughly to remove all traces of soap. Dry face piece with clean cloth uncontaminated with pesticide. Place face piece in a well-ventilated area to dry.

4. Store respirators, filters and cartridges in a clean dry place. . . . The respirator should be fitted properly on the face, not too high on the nose, with narrow portion over the bridge of the nose, and chin cup contacting underside of the chin. Headbands should be adjusted just tightly enough to insure a good seal."[40]

Respirators should be worn by those who load pesticides into spray equipment, who burn empty containers (the smoke can be lethal), who are exposed to obvious dusts or mists, or who are continuously exposed to not-so-obvious amounts.

However, full-face gas masks with their greater absorbing and filtering capacities, have to be worn by workers exposed to the extremely toxic materials. They are the workers who mix or apply pesticides in enclosed places, such as users of aerosols in greenhouses; workers who load aircraft and who act as flagmen on the ground for aircraft; and pilots who apply highly concentrated chemicals.

The pilots who do air-spraying and dusting have been especially exposed to pesticide hazards. The World Health Organization has advised them in particular:[41]

1. Not to join ground crews in the job of loading pesticides into the plane.
2. Never to fly through their own spray mist.
3. To have regular blood cholinesterase tests when working with organic phosphates.
4. To use appropriate respirators and goggles.
5. To change regularly into clean uncontaminated clothing.
6. To try to choose planes so designed as to reduce exposure hazard. Most aircraft used in spraying are not designed for the purpose, and so put the pilot in some risk of contamination from his toxic cargo.

Not only the aerial spray men need radical re-designing of the equipment for applying new agricultural chemicals. Old-style equipment often makes hazardous exposure inevitable for men applying pesticides at ground level, and adequate protective clothing may be quite impossible. Dr. Clyde M. Berry wryly remarked to the Society of Agricultural Engineers:

"You may now state that an application device for field crops is effective because you tested the foliage. I predict that you will soon be asked how much you are putting on, and in, the *operator* of the device. To those of you who think in terms of personal protective equipment — impervious clothing, boots, face shields, respirators and rubber gloves — I would point out that these are temporary and/or emergency measures. The real answer lies in engineering. Wear these protective devices yourselves if you doubt me. Wear them for a full day in the blazing summer sun, and you will return to your air-conditioned office and take another look at the Frankenstein you have created."[42]

Because equipment is dangerously obsolete for many of the new pesticides, it has been suggested that a manufacturer — as part of his required pre-marketing research — should be responsible for developing and field-testing really practical protective equipment and procedures, before a pesticide could be legally saleable.

Farm Facts

Are people on the farm taking precautions with pesticides? Very irregularly, according to Dr. Clyde Berry. The farmer finds that:

"A sign on his planter warns against the dangers of insecticides and urges that he follow the precautions of the manufacturer. The insecticide label warns against breathing the dust. No retail outlet for respirators exists in his community. Prompt washing is urged if skin contamination occurs. There are no showers in the south forty. His medical resources are limited. There may not be a rural physician in the community. A hospital may be miles away. Health and accident insurance may not be available or may be prohibitive in cost. A local health department, if one existed, would

not be likely to provide services in the area of occupational health and safety. In the absence of competent health and safety facilities the farmer must rely on his own knowledge and judgment. These may be inept. He may not seek medical attention at all."[43]

Gloves, protective clothing, and respirators are hot and uncomfortable in sunny fields. They are likely to be cast aside. In Iowa, experienced observers reported:[44]

"Because of the small parts which make up a spray nozzle, it is impractical and nearly impossible to clean them when gloves are worn. High clearance machines are bad to handle when the nozzles plug. Unless the spray boom is lowered by the operator, he must reach up to remove the nozzle. Since the nozzles are dripping spray material, it runs down over the hands and arms of the operator, sometimes reaching the chest and abdomen before the cleaning job is completed and the nozzle reinstalled."

"There appears to be a general antipathy toward the use of respirators . . . It is a general practice to wear the respirator going one way down a spray lap, and to drop it beneath the chin on the return lap when driving into the wind. This is not a good practice since the inside of the respirator has a tendency to collect spray residue."

"Exposure to spray drift is unavoidable under most field conditions . . . there are nearly as many types of spray rig as there are farmers who have them. Most of these pieces of equipment are home made affairs."

The farm worker is naturally removed one step further than the farmer from safety in pesticide use. He is dependent upon his employer to provide understanding of safe use, handy washing facilities, protective clothing and equipment, first aid and medical care in emergency, safe application equipment. He is hardly in a position to initiate a safety program of his own. Washing facilities are vitally important in safe use of pesticides — to prevent skin contamination, and also to prevent contact of food and cigarettes with contaminated hands. But washing facilities are famously scarce for farm workers.

LAWS

Labeling of Pesticides

Are there any governmental safety controls on pesticide sales? The Federal government requires a manufacturer to do certain testing, packaging, and labeling before a pesticide can be marketed across State lines. These regulations are intended to safeguard the consumer who buys pesticides (so he can be sure the chemical he buys is the effective pest-killer it is supposed to be) and the food consumer (so he can be sure what he eats does not contain more chemical residue than his health can tolerate). They also protect the pesticide user's health.

The pesticide labeling law giving supervision to the U. S. Department of Agriculture is the Federal Insecticide, Fungicide, and Rodenticide Act of 1947. The principle of that Law is that the label is the key to proper use. The manufacturer who wants to ship a new pesticide formulation in interstate commerce must submit to the USDA a proposed label giving the ingredients, adequate directions, and warnings. He has to prove his product can do the job he claims for it.

Requiring a governmental O. K. of a company's scientific testing means that information must be supplied by industry about the nature and effects of a new agricultural chemical.

The manufacturer must provide enough information for the USDA to judge the chemical's effectiveness and safety. The USDA may consult the U. S. Public Health Service about safety. Research study of the health effects on experimental animals from oral, inhalation and skin doses of a new pesticide is relatively simple for the manufacturer, if the pesticide is not to be used where it may contaminate food.

But the machinery of registration becomes really complicated and expensive — to both industry and government — when the pesticide is to be used in food production. Then, the U. S. Food and Drug Administration, acting under authority of the Food, Drug, and Cosmetic Act as amended in 1954, must be satisfied that the chemical can be used without leaving an unhealthy residue in the crop. Only after the FDA says yes, can the Department of Agriculture register a pesticide for use on crops.

To find out the probable results of people eating the pesticide often, with their food, research must be done over a longer period and with a greater variety of animals, than for a pesticide of no concern to the FDA. The usual food pesticide research program has two-year feeding tests on rats, one-year feeding tests on non-rodent species, complete pathological records on the test animals, devising of whatever chemical and biological methods are needed to analyse the residues of the new pesticides.

The simplest pre-marketing research discovers the dangers to warm-blooded animals from an occasional heavy exposure. It shows what can happen to handlers of the concentrate in industry and on the farm, to workers who inhale spray or rub against sprayed foliage.

But the elaborate testing done for the FDA is to reveal the effects of repeated exposure to small amounts. "What makes this problem of chronic toxicity difficult is that one is looking for everything," explains Dr. Ralph Connor, Vice President of Rohm & Haas Company."[45]

"The effects may not be shown by recognizable symptoms, and they may occur very gradually. In a case like this, we feed animals a diet containing the material under question. Certain animals will be fed at one level, others at another, so that, all told, we will have five or six different levels of exposure. We try to pick these so that we will include so much toxicant at one or two levels that we will get some sort of toxic effect. This is generally done with rats for a two-year period which covers practically the entire life span. We also carry out feeding experiments on some other species — usually dogs. The animals are observed for any detectable changes in their health, rate of growth, etc., and at the end are sacrificed. All the organs are examined — heart, brain, spleen, liver, etc. — to look for any changes that may have been produced. There is, of course, the theoretical possibility that some effect may have been produced that all this may have overlooked, but I do not know of any more thorough way to do it."

"From this point there is no set procedure to be followed in studying chronic toxicity, but what needs to be done varies with the product and the use to which it is to be put. For example, one of our insecticides is recommended for use in dairy barns. Here, it would be important to know whether any of the material could get into the milk. We therefore synthesized the radioactive insecticide, fed it to cows and analyzed the milk for the insecticide. We used radioactive labeling because it is a much more sensitive method than any chemical analysis and because it shows up the metabolites as well as the original pesticide."

"In the case of our herbicide for use on rice, it was important to know whether the rice would contain any of this material after harvest. We therefore, fixed up some swimming pools in which we could grow rice on our experimental farm and made the application of radioactive herbicide and analyzed the plants periodically to determine the presence or absence of our product. In this case, we were able to show that long before harvest there was no herbicide or metabolite from it in the rice plant."

"Testing on humans? There is only one type of test for which this is feasible and this is patch testing to determine skin sensitization or irritation. We need to have this information, of course, for the protection of our own workers. We use 100 subjects obtained as volunteers from our Research Laboratories. I do not think it is practical to *feed* such materials to people, not only because of some possible unknown hazard to them, but because I am not sure that the results would mean much. Usually, if something is highly toxic, the program I have described has shown this. The thing to be most concerned about at this stage of the work is whether something is occurring that is not readily recognizable. To determine this, it is far better to use animals which can be sacrificed to permit a detailed examination of all parts of the body, in order to pick up any abnormalities."

The Federal rules give prescriptions for labeling every sort of formulation of each compound. For example, chlordane in wettable powders above 25% concentration, and in oil solutions for agricultural use, must be marked:

"Caution: Harmful if swallowed. Contact with skin causes toxic symptoms. Avoid breathing dust or spray mist. In case of contact with skin, wash with soap and water. Avoid contamination of feed and foodstuffs."[46]

For parathion above 2%, the label must include the word POISON in red, skull-and-crossbones, a statement of the antidote and first aid treatment in case of injury:

> "Warning: Poisonous If Swallowed, Inhaled, or Absorbed Through Skin! Rapidly Absorbed Through Skin! Do not get in eyes, on skin, or on clothing. Wear natural rubber gloves, protective clothing and goggles. In case of contact, wash immediately with soap and water. Wear a mask or respirator of a type passed by the U. S. Department of Agriculture for parathion protection. Keep all unprotected persons out of operating areas or vicinity where there may be danger of drift. Vacated areas should not be reentered until drifting insecticide and volatile residues have dissipated. Do not contaminate feed and foodstuffs. Wash hands, arms and face thoroughly with soap and hot water before eating or smoking. Wash all contaminated clothing with soap and hot water before reuse."[46]

For parathion dusts 2% and below, the word "Warning" remains, but no need for POISON, skull-and-crossbones, or antidote statement.

A provision of the labeling law that one must not sell a pesticide except in the manufacturer's unbroken container prevents the consumer from getting any pesticide separated from its cautionary label. Industry and Agriculture Department people believe that this is also an indirect safety measure, since large packages of the more toxic pesticides are unlikely to be purchased except by expert users who know how to handle them.

Once a pesticide is on the market, Department inspectors are entitled to take samples from plants and retail stores to test whether official standards are still met. If a product is found not to meet the health and efficiency standards set for it, it can be seized everywhere it is being marketed.

All except five States — Alaska, Connecticut, Delaware, Idaho, Iowa — have pesticide labeling laws, similar to the Federal Act, placing conditions on pesticide marketing within the State. Two of the exceptions, Connecticut and Iowa, have laws pertaining just to insecticides and fungicides.

Use of Pesticides

In this manner, the conditions of sale are regulated. But what about regulation of use? The Federal government attempts such regulation only incidentally by insisting on its packaging and limited-residue rules. However, a pesticide shipped legally interstate, then sold from a "broken package," — that is, transferred from the manufacturer's labeled quart can to the storekeeper's pint bottles — could be controlled only by State law. The USDA's Pesticides Regulation Division, unlike the FDA in seizing contaminated food, can not pursue such a violation within a State.

The limits, set by the Food and Drug Administration, on the amount of poisonous chemicals in food crops — residue tolerances — give a little protection indirectly to an agricultural worker. At least, there is a lid on the

amount of poisonous material he can contact on a food or feed crop. This though, is no help to him at all if he is working in cotton. Besides, an amount or method of application may be dangerous to handle, despite its leaving behind at harvest time only a legal residue of no danger to consumers. It is also admitted among industry, farmers, and the FDA, that there are frequent crop seizures for excessive residues. Farmers often spray more than the allowed limit, from ignorance or financial anxiety about their crop.

Twenty-nine State governments now exert some direct control on the way pesticides are *used*. As pesticide sales have boomed, and new kinds continually came into use, the "custom-applicator" business — spraying and dusting for hire — has emerged with problems of its own. Both airplane and ground spraying businesses have to be run by true specialists with efficient equipment, or there is serious possibility of injury to the operators themselves, and to nearby crops, animals, and people, as the States have begun to discover.

A Model Bill has been urged on all the State legislatures since 1949 by the Council of State Governments and many officials and trade associations in the pesticide field, to require custom applicators to have licenses for which they must pass qualifying examinations. This measure protects reputable businesses, as well as workers, and the community. And the administration of licensing laws is nothing new for the States. A few of the 29 States which attempt pesticide-use regulation have had a comprehensive concern about injuries which could not be met simply by custom-applicator licensing. The laws passed by some of the greater agricultural States, which grapple earliest with new technical problems in agriculture, may give a hint of future needs to other States.

California, Hawaii, Oregon, Texas, and Wisconsin have a licensing-and-permit system requiring not only licensing of custom-applicators but also permits for the owners of land to be treated. Two of these States also require manufacturers and dealers in certain pesticides to get permits. To receive a license for custom-application in Oregon, one must take a regular course and examination in pesticide-use given by county agricultural agents. The Oregon Chemical Spray Applicators Law has a special feature providing, in detail, for democratic handling of one of the newer problems of self-government. In suitable regions, 2/3 of the population may by passing a referendum, establish theirs as a large "protected area" or "restricted area." Within those areas, acting through special governing committees, Oregon residents themselves will plan "the time, place, manner, and method of the application of herbicides or insecticides" for their area as a whole.[47]

The constructive possibilities of such a law exist for any other State that will have a spry and enterprising attitude toward the new problems offered to government by such technical innovations as pesticides. California has been a leader in recognizing that new pesticides have brought new responsibilities to the State, and in inventing new ways to meet them.

In 1960, Governor Edmund G. Brown set up a Special Committee on Public Policy Regarding Agricultural Chemicals. The Committee held extensive hearings and issued a Report, which have encouraged public discussion of pesticide use, hazard, and regulation.

In addition to the basic pesticide labeling law, and a law providing for licensing and supervision of applicators, California has an Injurious Materials Law which restricts the use of certain extremely dangerous chemicals to persons having a permit and observing certain safety conditions. Though agricultural conditions are often thought hard to regulate because units are diffuse and unorganized compared to industry, in this and other surveillance efforts, administration on the county level has worked. A licensed agricultural pest control operator must register with the County Agricultural Commissioner where he will be working, and observe any special rules made by the Commissioner to protect special areas, crops, or wildlife in his district. Anyone in California wishing to use one of fourteen materials on the Injurious Materials list has to get a permit and information on safe use from the County Commissioner. TEPP, parathion, EPN, Systox, Phosdrin, Thimet, and sodium arsenite are all included. No dealer may supply these chemicals to anyone who does not have a permit.

In testimony before Governor Brown's Special Committee, Mrs. Goldy D. Kleinman and Dr. Irma West of the State Department of Public Health, asserted that government will have to take some new legal positions on pesticides, if the upward trend of injuries is to be reversed. Washing facilities for farm workers must be provided: "Such facilities are not usually available in the field and many farm laborers may not bathe after each day's work." More forceful inspection seems to be needed to see that safe practices when available, are used: "Could the agricultural industry pay inspectors . . . in much the same way as the canning industry pays inspectors to supervise canning procedure?" Or is a general market for potent poisons impossible to make safe in any way? Would it be wiser to restrict the users of the highly toxic agricultural chemicals "to those who can demonstrate ability and equipment to work safely in the same way as the users of radioactive isotopes must first demonstrate their ability to use radioactive materials safely?"[48]

British Regulations

Such questions asked in California may sound brash to U. S. agriculture officials and chemical industry. But in Great Britain, they had been answered before they were asked.

In California, from 1956 to 1961, twenty children and four adults died from accidental poisoning by the weed-killer sodium arsenite. There were also a number of recorded instances of animals and plants killed because of careless handling of sodium arsenite. Therefore that chemical was recently placed on the California Agriculture Department's Injurious Materials list so that a permit is now required when using it. In Great Britain, sodium arsenite had been withdrawn from the commercial market.

The most recent official study of toxic chemicals in Britain recalls:

> "In the 8-year period 1946-53 before the introduction of the Regulations to control the use of the more toxic pesticides . . . there were eight deaths from these substances. In the eight years which have elapsed since the Regulations came into force in March, 1953, one agricultural worker died

as a result of poisoning; this death occurred in 1955 from the use in greenhouses of ethylmercury phosphate. This substance is now used only in two special factory premises for the treatment of sugar beet seed and is no longer available to agricultural workers."[49]

In the same 1953-60 period, there were only 30 nonfatal pesticide illnesses among British agricultural workers.

What are the Regulations that have practically stopped pesticide casualties in Great Britain? They are stringent. They invoke penalties for offenses against safety. They employ inspectors. They have entailed prosecutions.

The British Agriculture (Poisonous Substances) Regulations of 1952 refer to certain extremely toxic agricultural chemicals. Twenty are on the regulated list at present, including Systox, DNOC, endrin, parathion, Phosdrin, schradan, TEPP, HETP, and organic mercury compounds used in aerosols. When workers are using these substances, they perforce must take certain precautions, and their employer must undertake defined obligations.

In the most exact and lengthy detail, safety requirements are spelled out: The worker *must* wear specified protective clothing and remove it at the end of work. He must wash at the end of each work day and before eating, drinking, or smoking. He *must not* blow or suck a spray nozzle; "use for any purpose other than drinking, a drinking vessel provided by his employer"; or work longer hours than set forth in the law. The employer *must* ensure that any worker who carries out a scheduled operation has been trained in the precautions to be observed and is adequately supervised." He must provide protective clothing with replacement filters for masks, accommodation for the worker's personal clothing, soap and towels and water "for all the workers likely to use them and sited near, but outside, the spraying area" safe drinking water. He must "ensure that any spraying or soil-application apparatus is washed before a worker repairs it." He must keep a work record for each employee, and he must not permit a pesticide worker to be on a job longer than the limit set in the law.[50]

These musts are not propaganda or platitudes. They are rigidly enforced by a staff of 72 or more inspectors. An employer who does not provide and supervise safe conditions, or a worker who will not make proper use of what is provided, when working with the most toxic chemicals, is guilty of a legal offense. An isolated offense can be corrected on the spot cooperatively and informally. But cases of continued violation have brought about 32 prosecutions since 1953.

British authorities credit their use Regulations not only with directly preventing injuries, but with indirectly erasing many possible occasions for injury:[51]

"The need to comply with the Regulations makes the use of these pesticides troublesome. Farmers and workers clearly prefer to use pesticides that require little or no protective clothing, so that their choice, if they have one, is for a non-regulated as against a regulated chemical . . . This attitude, in turn, has stimulated manufacturers to produce less poisonous materials."

EDUCATION

It is impossible, actually, for anyone to handle pesticides effectively and safely unless he has been taught to do so. Education in pesticides use has to be the user's main shield. Laws can only back up educational efforts, and coerce the recalcitrant. What kind of education about pesticides do we have in the United States?

All information to the public is, like the Federal law and most State laws, based on the opinion that a good label is the only important guarantee of safe use. Government and industry efforts to teach consist almost entirely of "Read-the-Label" campaigns.

The educational task is done mostly by the U. S. Department of Agriculture, through its County Agents, and by industry, through individual companies or trade associations. Others provide worthwhile information, but can not have a massive national impact: the American Medical Association, farm magazines, some State Farm Bureau organizations, some State agriculture departments, some State health departments, the National Safety Council.

As Mr. Justus Ward, Director of the USDA's Pesticides Regulation Division, says:[52]

> ". . . the basic concept of the law is that an individual of ordinary intelligence is competent to read and follow label directions, and if those directions are adequate when complied with to prevent injury that is as far as this law is expected to go."

The USDA's County Agent acts as counselor and friend at the farmer's elbow. He is in constant communication with the agricultural people of his area, answering their questions by phone and mail, visiting the farms, demonstrating techniques, organizing meetings, passing along expert technical advice from his State Agricultural Experiment Station, and from Washington, for local crop conditions. So his office is the obvious funnel through which most facts and advice on pesticides reach the agricultural public. Through him, manufacturers pass to farmers, horticulturists, and home gardeners, explanations about a product; and the U. S. Department of Agriculture along with Extension specialists of his own State, gives explicit directions on how much of which pesticide to apply to which crop, and how, and when. Occasionally, there will be a uniform nation-wide campaign launched by the Department of Agriculture in Washington, such as a blanket distribution of "Read-the-Label" leaflets, signs, telephone tabs, car stickers, etc., and in this every County Agent will participate. The specialty of the Extension Service, though, is its local flexibility, so there are no firm rules for a County Agent about the form or intensity of his pesticide education effort. How much he accomplishes depends upon his own interest, ability, and time.

Do They Read the Label?

Have agricultural pesticide users in the United States been educated successfully? The U. S. Department of Agriculture and many State agriculture officials think they have. Agricultural administrators may be excused for being sometimes overly defensive, since the farmer is less likely to approach them about a dermatitis or a respiratory complaint than about a pest control problem that bothers him. They must concentrate on the crop-marketing aspect of the farmer's welfare. Out of habit, they may tend to think the insect-crop relation is all-important and all else regarding pesticides is sentimentality.

It is of course, impossible to measure the effectiveness of having the entire statutory effort for user safety devoted to getting adequate labels, and the entire educational effort devoted to urging workers to "Read-the-Label." It can only be indicated negatively by the incidence of injuries.

Dr. Wayland J. Hayes, Jr. of the U. S. Public Health Service believes "the safety record of the newer pesticides in the United States is good."[53] We appear to have had far fewer victims of pesticide misuse than Japan or India, or many of the under-developed nations.

But, while we may not have the accident rate of many other countries, neither do we have a safety record like Britain's.

A sign that information about pesticides has not been enough is the pilot program launched in March 1962 by the National Agricultural Chemicals Association — an industry group. The organization reacted to Florida's rising pesticide casualties, by announcing "Education — or rather, re-education" as the "only effective and enduring solution to the problem." They set out to "saturate" the State of Florida with safety information, to reach every dealer, farmer, and homeowner who handled pesticides in an experiment to show what more intensive education could do. The usual posters, leaflets, labels, gummed packing tape, were distributed for display wherever pesticides were "stored, mixed, loaded, or used."[10] But a new involvement of the mass media was tried by preparing simultaneous items for newspapers, magazines, radio, TV, and meetings. Perhaps the most promising feature of the campaign was the new collaboration it arranged among the State Department of Agriculture, the State Board of Health, the State Industrial Commission, the Board of Education, the College of Agriculture, all of whom took part in the project. At the time of writing, the campaign has not yet finished.

Surely a long-term effort, more pervasive than what we have had, is needed in all the States — not just in Florida. Surely the government departments concerned could initiate pesticide-information programs in which they would act together — and not continue to wait for industry to show them how.

Where Pesticide Information is Needed

If the pesticide injury rate is to be reduced through education, certain groups of people will have to learn more than they now know about pesticide hazards:

Parents,

Farmers and custom applicators,

Agriculture officials at every level,

Doctors, hospitals, and public health personnel,

Employees of farmers and applicators.

The first four groups all are in positions of responsibility for the health of others, and should have information channeled especially to them. If parents knew it was a life-and-death matter to find out whether a chemical is harmful before buying, to store it out of reach, to destroy used containers; if employers knew enough to protect themselves, and knew the necessity of safe working conditions for employees; if agricultural officials were aware enough to discourage from using pesticides anyone not in a position to use caution, and to recommend the least toxic pesticide wherever possible, the pesticide situation in the United States would be far more sane.

How to inform doctors and medical facilities about the new ailments from new pesticides which they may see, is a particularly vital problem. Until, as an A.M.A. Committee has recommended, these facts are given in medical training courses and all our doctors have been exposed to them there, special ways must be arranged for getting through to them generally and quickly. Poison Control Centers around the nation, and two Communicable Disease Centers, are always available to advise doctors who call, but the doctor must know enough to be on the right road to diagnosis in order even to know he should call on them!

The Committee on Pesticides of the American Medical Association has noted that:

> "Growing recognition of the health problems of pesticides and other commonly used chemicals found on the farm and in the home has fostered numerous suggestions for informing physicians about those products that have obvious or latent potentialities for harm . . . Despite this activity, a tendency exists to dismiss medical problems involving non-drug compounds as the concern of the rural practitioner or the industrial physician. This attitude is both unjustified and unrealistic" . . .

> "Practicing physicians as well as medical students should be informed of the dangers of widely used, nonmedicinal chemicals, and should be familiar with methods for the prevention and treatment of accidental poisoning."[54]

In Great Britain, the Government is issuing to medical practitioners, hospitals, and health officers a memorandum calling their attention to symptoms and treatments of poisoning from the highly toxic pesticides on the Agriculture Regulations list.

PRESENT HEALTH PROGRAMS

Emergency Information

The U. S. Public Health Service now operates 460 Poison Control Centers in 48 States (except Vermont and Montana), and the District of Columbia. The Centers keep records of the ingredients of trade name products that are poisons, including pesticides, and the antidotes for poisoning. This information is available around the clock to those (mostly parents and doctors) who call for it. Some Centers also offer some education about poisons through visiting nurses of local public health departments.

Medical Research

Since 1949, the Communicable Disease Center of the U. S. Public Health Service has been analyzing the toxic hazards to man of economic poisons used in public health and agriculture. In its main laboratory in Atlanta, Georgia — and in two field stations at Wenatchee, Washington and Phoenix, Arizona — scientists make various laboratory studies. They observe farmers, orchardists, and spray pilots occupationally exposed to pesticides; volunteers for controlled experimental exposure; and patients sick from over-exposure.

Medical Supervision

Besides research in effects on humans, and emergency treatment information, another form of medical resource is needed for those using the more toxic pesticides: regular surveillance by doctors of exposed men and their working conditions.

Medical surveillance is thought finicky or impossible where it does not exist. But the World Health Organization has reported:[55]

> "It should be emphasized that the earliest signs of poisoning both by the organo-phosphorus and the chlorinated-hydrocarbon group of insecticides are essentially mundane in character. Headache, fatigue and mild indigestion might easily and in some cases, justifiably be attributed to the effects of long hours of work, perhaps under trying conditions. Likewise with other compounds, such as the dinitrophenols and pentachlorophenol, fatigue and profuse sweating might easily be attributed to the hot environment in which poisoning by these particular compounds usually occurs. It is therefore most important that adequate medical supervision of all pesticide operators be available when new or dangerous pesticides are used, so that workers who draw attention to any of these premonitory symptoms may receive the serious medical attention that the circumstances undoubtedly demand."

In Great Britain, employers are "strongly recommended" by the Government to have medical supervision of workers with pesticides, particularly the more toxic organic phosphate and dinitro compounds. "Experience has shown,"

the British Government states, "the value of standing arrangements for the medical supervision of workers using poisonous substances."[56] Employers are warned that there is regular need for blood sampling of workers long-exposed to dinitros and organic phosphates, and that in case of accident, "it may not be possible at a moment's notice to call on a doctor who will be ready to undertake this work." It is recommended "as a reasonable precaution to engage a doctor before using these substances, to explain to the doctor the uses expected to be made of these substances and to follow the doctor's advice which will, wherever necessary, be based on his examination of workers." H. M. Inspector of Factories or the Ministry of Agriculture, Fisheries and Food can help employers to find the doctors they need. For medical supervision to be adequate, the employer will provide the doctor with facilities for examinations and with records of the workers' contact with toxic compounds. The doctor can then point out when stricter precautions are needed, when a worker should be shifted from use of toxic chemicals, when a worker needs medical treatment or hospitalization.[57]

> "It is obvious," in the judgment of the California Department of Health, "that any hazardous work requires both a safety and a medical program working closely together. Either program without the other is inadequate (only 'half safe') . . . When environmental control is particularly difficult, as in agriculture, the more critical and the more active is the medical program because disease and injury are getting closer to the workers who must be examined and treated more frequently." . . . "Medical supervision has more to offer in the prevention of organic phosphate poisoning than it has for many other occupational hazards. First, there is the cholinesterase test which can detect excessive exposure before workers become sick . . .
>
> Second, there is an antidote for poisoning which if administered early and in adequate amounts can save the lives of victims who have absorbed several times the fatal dose . . . Third, the extremely hazardous properties of organic phosphates and the hundreds of cases of occupational poisoning which are occurring annually in California point to the urgency of utilizing all protective measures both environmental and medical."[58]

Accordingly, the California Division of Industrial Safety has issued orders *requiring* employers in agriculture to provide medical supervision for workers who regularly apply certain highly toxic organic phosphate pesticides. And it is *recommended* that "all who work with organophosphorous pesticides or any other hazardous materials be medically supervised."[58] A California employer affected by the new orders must engage a doctor to watch his employees' condition regularly, arrange blood cholinesterase tests, advise when workers should be shifted from dangerous exposure, and be ready with prompt care in poisoning emergencies. Medical and laboratory bills are to be paid by employers:

> "Medical supervision, regardless of what it costs, should be looked upon as a cost of production of using hazardous materials. Improving the safety of operations can often reduce the services necessary and therefore the cost of the medical program."[58]

A SCIENTIFIC WAY THAT IS SAFER

The general use across the nation of very poisonous pesticides has had other disadvantages besides endangering inexpert users. It has raised the problem of poisonous residues in food, and has produced insect populations resistant to the chemicals that temporarily controlled them. Effects of chemical pesticides on man and all forms of life are so incompletely understood, that it is quite possible we are bargaining wholesale for even more damage in the future.

Widespread use of the most toxic chemicals may even be ineffective in controlling pests. Erasing some insects by chemicals will often free their natural prey, so that species formerly unnoticed, begin to flourish and in turn become pests. Dr. Paul DeBach, entomologist at the University of California at Riverside, recalls:[59]

> "I worked with one, perhaps the first, notable upset from the use of DDT. The enormous use of DDT on citrus in the Central Valley of California beginning in 1945 promoted the cottony-cushion scale (which had been under excellent biological control in California since the vedalia beetle was imported from Australia in 1888-89) from the status of a scarce pest to one of the most damaging pests within the space of two years. From the end of 1946 until the spring of 1947, I was unable to find a single living vedalia beetle in this area. They had to be reintroduced, and after spraying procedures were changed, the cottony-cushion scale was again reduced by its predator. Meanwhile, many growers suffered serious losses."

Nationally, we have been eager to spray and slow to count the consequences. Is it now time to think out a more rational approach to pest control? Actually a start has been made. A more scientific alternative exists which has been termed "integrated control."

What is Integrated Control?

In integrated pest control programs, maximum use is made of natural enemies, and minimum use is made of chemicals.

> "Biological control and chemical control are not necessarily alternative methods; in many cases they may be complementary, and, with adequate understanding, can be made to augment one another . . . It is shortsighted to develop a chemical control program for the elimination of one insect pest and ignore the impact of that program on the other arthropods, both beneficial and harmful . . . On the other hand, this approach is no worse than the other extreme which would eliminate chemicals to preserve the biological control even in the face of serious economic damage. For we must recognize that modern agriculture could not exist without the use of insecticides. The evidence that biological and chemical control can be integrated is mounting."[60]

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This attitude of long-range scientific calculation aims to free crops of unwanted insects and weeds as economically as possible, with as little environmental damage as possible. This is not merely letting nature take its course.

An ecology-oriented scientist called on to rid an area of pests, will study the relations of all living things in the environment, find which natural controls are on his side, and act to bolster them. He wants the most effective attack on the particular insect with the least incidental risk to humans, wildlife, soil, water, beneficial insects, and harmless plant life. So he selects the victim, the weapon, and the application time, with precision. Aware of all the living organisms in the area, he avoids the broad-spectrum chemicals that endanger many species along with the pest.

If this sort of pest control concept spreads, some reorientation of the U. S. Agricultural Extension Service may be needed. Already, where integrated control is practiced in California, ecology-minded entomologists work in close liaison with County Commissioners and farmers, choosing the best methods for their region.

When pest control is approached in this manner, the method used varies to suit the particular problem. In some places, the best protection is merely to foster predators already in the area, as when wasps' nests in North Carolina are sheltered from their enemies so the wasps may successfully prey on a tobacco-pest. Or, it may be wise to hunt out, import, and mass-breed predators or parasites to feed upon the pest, as entomologists introduced enemies of the sugar cane leafhopper in Hawaii and of the Klamath weed in California.

Sometimes, the treatment used is a biological-chemical combination as in "the chemical strip treatment of alternate pairs or rows of oranges in order to permit the build-up of a parasite of purple scale, thereby achieving 50% savings for pest control over a considerable area."[61]

The recent U. S. Department of Agriculture eradication of the screw-worm from a large southeastern part of the United States was accomplished by mass producing and sterilizing males to mingle with the rest of the pest population. Other highly adventurous research, in insect diseases, has made it possible to attack the alfalfa caterpillar in California by spraying fields with a virus deadly only to pests. And for some years, great acreages of the U. S. have been planted in corn, wheat, and alfalfa scientifically developed to be, themselves, pest-resistant.

It may take several seasons after ceasing general spraying to re-establish a balance between the pest and its natural enemies; it takes six to ten years to develop pest-resistant plants; "parasites may be very effective over a 10-year period, but not prevent severe outbreaks one or two years out of 10."[62] Therefore, a strategic use of chemicals can help to promote a favorable biological balance.

> "Biological control is thus utilized to permanently increase environmental resistance to an introduced pest . . . Because chemical insecticides are nonreproductive, have no searching capacity, and are nonpersistent, they constitute short-term, restricted pressures."[63]

Could biological control solve most of the agricultural pest problem?

> "To those who know the subject, the future couldn't be brighter," says one entomologist at the University of California. "There are many major insect and weed pests in the United States for which natural enemies can be imported" . . . "In Canada . . . the major emphasis is on biological control, and long-term ecological studies have clearly demonstrated that insecticides in the orchard often create more problems than they solve. Canadian entomologists also are making considerable progress in biological control of forest pests."[64]

But before such programs could be widely adopted in the United States, there would have to be research resources to study more thoroughly the habits of our major pests; and development against a variety of pests of presently limited techniques, including male sterilization and chemical attractants with traps.

The Entomology Research Division, USDA, is working in its laboratories on new ways to control insects. And the University of California has a Department of Biological Control, which in addition to pursuing research, teaches and advises integrated pest control methods to State and County agricultural officials. However, in the United States generally, there is a shortage of funds and staff for development of integrated biological-chemical methods. Only about 40 entomologists (2% of the trained men available) in the United States, are working full time on biological control. The rest are absorbed mainly in industry or in industry-sponsored pesticide research in universities.

PUBLIC QUESTIONS

1. The Department of Agriculture practically determines how much and which pesticides are used. Is there adequate assurance that public health interests are fully involved in their decisions?

2. Do economic incentives, alone, provide enough impetus for industrial development of pesticides as little toxic as possible to humans? Or may the high cost of testing and registering a new pesticide lead, instead, to a general relaxation in the effort to produce new ones continually? To encourage development of less toxic pesticides, do we need more of the artificial incentives, such as government-sponsored research, government regulation of use of the more toxic pesticides, and State systems of compensation for workers injured in agriculture?

3. Do the variations and gaps in State labeling laws leave open some *intrastate* loopholes so that it is possible to market within a State pesticides dangerous to health?

4. Are all injuries from pesticides in agriculture consequences of "misuse"? If so, does the modern community not hold itself responsible for accident prevention in agriculture, as it does in supervising airplane safety, car safety, traffic safety, factory safety, food-consumer safety? A slippery curve may be safe, if you read the signs and drive properly, but fences are put up to prevent speeders from dropping off, and if there are some casualties, the road may even be altered. In industry, if enough people make a stupid mistake which involves injuries, this is considered a safety problem to be reckoned with, not something to be ignored because the machine was *misused.*

5. Is pre-marketing testing adequate? Careful and thorough as testing on animals may be, it can not give a full picture of the human health hazards from using a new pesticide. Should there be more of limited field testing on humans before a pesticide goes on the general market, to show actual human exposure hazards in addition to what is known about sheer animal toxicity? Would this provide more knowledge of chronic and cumulative effects on humans? Should the development of practical protective equipment, procedures, and medical methods become a necessary cost-of-production for pesticide manufacturers?

6. Should marketing of high-toxicity compounds be more restricted?

7. Is enough known about "potentiation" to be sure when the safer pesticides are safe?

8. Do ignorant users often get hold of the most-toxic pesticides for unsuitable purposes? If so, should this be prevented by permits and licenses, in the same manner as we use drug prescriptions and drivers' licenses?

9. In each State, where should responsibilities be placed for agricultural safety with pesticides? What are the employer's obligations, what are the worker's? Who should inspect and enforce safe conditions?

10. Is the education we need about pesticides being done by State health officials, county agents, etc.? How can more doctors be satisfactorily informed?

11. Does read-the-label education take us all the way we need to go in teaching safe agricultural use of pesticides? What of those — foreign, illiterate, ignorant, or near-sighted — who *can't read* the label? Or most people, who do not have well-trained clinical imaginations with which to envision fully the meaning of "Contact with skin may cause toxic symptoms"? Or those whose circumstances make it impossible to *follow* the label — because soap and water, protective clothing, and first aid are all unavailable? Or a man more vulnerable than the average, because the weather is unusually hot and humid, or because he has a health condition that can not withstand pesticide exposure?

12. Are the problems of pesticide injury in agriculture recognized in Federal and State health programs? Are the community's preventive, diagnostic, and treatment resources available?

13. Is farm safety necessarily harder to maintain than industrial safety? If so, should we ignore it or should we insist on more money, ingenuity, and restriction of hazardous materials, to accomplish farm safety programs? Can progress be made in achieving safe conditions of pesticide use for farm workers, without the spur of workmen's compensation systems?

14. Do we wish our government to emphasize the development of biological pesticide practices, with a view to adopting a public policy of integrated biological-chemical control?

NO SIMPLE OBVIOUS CONCLUSIONS ARE POSSIBLE

We must recognize how many uncertainties and public questions do surround the use of toxic pesticides. The "pesticide problem" affects vegetation, wildlife, water supplies, soil, insect populations, insect-borne diseases, adequacy and purity of food supply, recreation, industrial handlers, farm users, food consumers. Even in the limited study of only its *health effects on agricultural users,* the problem is complicated. Chemists, biologists, entomologists, medical research workers, public health officials, agricultural experts, manufacturers, have few absolute answers.

One basic fact is certain: in our advanced technological society, it is economic nonsense to talk of outlawing a whole class of useful tools. We would never confiscate all knives because people are often cut and sometimes killed by them.

But there is no economic inevitability about the ways in which we choose to use our dangerous tools. Society has the political right to choose the aims for which agricultural pesticides shall be used, and what the forms, functions, and restrictive conditions shall be.

So far, most of these choices seem to have been made for us by our experts. Because they are so often responsible and humane, and because U. S. farmers are so often intelligent technicians, the dangers of the situation have been conspicuous to the public only in intermittent moments of panic.

But pest control is an increasing problem, and the use of chemical pesticides is one factor that is here to stay. The management of this public tool must be consciously assumed by an informed public.

The extent of the pesticide hazard to agricultural users is uncertain. The best public-health, educational, and legal methods of control are being disputed. These questions are a political responsibility of the U. S. public — to study, think over, and decide, with the advice of its experts.

LITERATURE CITED

1. Bureau of Labor Standards, U. S. Department of Labor. *Safety Standards.* vol. IX, no. 1, Jan.-Feb. 1960, p. 7
2. Upholt, William M. *Agricultural and Food Chemistry.* vol. 3, no. 12, Dec. 1955, p. 1002
3. Young, John; West, Irma; and Loretz, Wayne. *California's Health.* vol. 12, no. 17, March 1, 1955, p. 132
4. Hayes, Wayland J. Jr. *A. M. A. Archives of Environmental Health.* vol. 3, July 1961 p. 49
5. Florida. *State Board of Health Report.* (unpublished) October 1961
6. California. Department of Public Health. *Occupational Disease in California Attributed to Pesticides and Agricultural Chemicals - 1959.* Feb. 1961, p. 8
7. Conley, Bernard E. *Journal of American Medical Association* vol. 163, April 13, 1957, p. 1339
8. Conley, Bernard E. *A. M. A. Archives of Industrial Health.* vol. 18, August 1958, p. 128
9. California. Department of Public Health, op. cit., p. 14 and *Occupational Disease in California Attributed to Pesticide and Agricultural Chemicals - 1960.* November 1961, pp. 4, 6, 12
10. National Agricultural Chemicals Association. *N. A. C. News.* vol. 20, no. 4, April 1962, p. 3
11. Unpublished letters to author
12. Unpublished letter to author
13. Bureau of Labor Standards, U. S. Department of Labor. Bulletin 161 Revised. p. 14
14. World Health Organization. Technical Report Series No. 114. 1956. pp. 13, 14, 17, 21
15. Wolfe, Homer R., Technology Branch, Communicable Disease Center, U. S. Public Health Service. *Washington State Weed Conference Proceedings.* Nov. 1960, p. 5
16. Durham, William F. Technology Branch, Communicable Disease Center, U. S. Public Health Service. *Proceedings of 1960 N. W. Perishable Loss Prevention Short Course.* Feb. 17-18, 1960, p. 30
17. Berry, Clyde M. *Journal of the Iowa State Medical Society.* July 1959, p. 387
18. Doyle, Henry N. *Public Health Reports.* vol. 72, no. 2, February 1957, p. 147
19. Schwartz, Louis. copied from *Arhiv Za Higijenu Rada.* vol. 3, Zagreb 1952, Br. 3
20. Province of Saskatchewan. Department of Public Health. *Annual Report 1960-61* p. 171; and unpublished letter to author
21. Unpublished letter to author
22. Unpublished letter to author
23. Malkinson, Frederick D. *A. M. A. Archives of Industrial Health.* vol. 21, February 1960, p. 91
24. U. S. Department of Agriculture. *Farmers' Bulletin.* No. 2062, September 1960, p. 11
25. U. S. Department of Health, Education, and Welfare. Communicable Disease Center. *Clinical Memoranda on Economic Poisons.* 1956, p. 25
26. O'Brien, Richard D. *Toxic Phosphorus Esters.* Academic Press. 1960. pp. 210-212
27. *Ibid.* p. 2
28. Ministry of Agriculture, Fisheries and Food. *The Safe Use of Poisonous Chemicals on the Farm.* Leaflet APS/1. London. April 1960, p. 12
29. Desi, I.; Sos, J.; Olasz, J.; Sule, F.; and Markus, V. *A. M. A. Archives of Environmental Health.* vol. 4, January 1962, pp. 95-102
30. U. S. Department of Health, Education, and Welfare. *Clinical Memoranda on Economic Poisons.* p. 63
31. *Ibid,* p. 65

32. Carpenter, C. P.; Weil, C. S.; Palm, P. E.; Woodside, M. W.; Nair, J. H. III; and Smyth, H. F. Jr. *Agricultural and Food Chemistry.* vol. 9, no. 1, Jan./Feb. 1961, p. 30
33. Hayes, Wayland J. Jr. *op. cit.* p. 53
34. U. S. Department of Health, Education, and Welfare. *Clinical Memoranda on Economic Poisons.* p. 52
35. Hayes, Wayland J. Jr. *op. cit.* p. 54
36. U. S. Department of Health, Education, and Welfare. *Clinical Memoranda on Economic Poisons.* p. 10
37. *Ibid.* p. 25
38. World Health Organization. Technical Report Series No. 114 p. 44
39. U. S. Department of Agriculture. *Agriculture Handbook No. 120* inside front cover
40. U. S. Department of Agriculture. *Respiratory Devices for Protection against Inhalation Hazards of Dust, Mists, and Low Vapor Concentrations of Certain Pesticides.* Leaflet. March 20, 1961, p. 7
41. World Health Organization. Technical Report Series No. 114, p. 21
42. Berry, Clyde M. Paper presented at annual meeting of American Society of Agricultural Engineers. Columbus, Ohio. June 12-15, 1960
43. Berry, Clyde M. *American Journal of Public Health.* vol. 49, no. 5, May 1959, pp. 620, 621
44. Long, Keith R. and Walden, John. *Preliminary Studies on Economic Poisons.* Bulletin no. 4. Institute of Agricultural Medicine. State University of Iowa. September 1958, pp. 5-7
45. Unpublished letters to author
46. U. S. Department of Agriculture. *Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act.* (Title 7, Ch. III, Pt. 362, Interpretation 18; Revision II) Federal Register. March 9, 1962, p. 2270 and p. 2274
47. Oregon. House Bill No. 1208. 573.545 (2)
48. Kleinman, Goldy D. and West, Irma. Paper presented at meeting of the Special Committee on Public Policy Regarding Agricultural Chemicals. Oct. 20, 1960, p. 8. Sacramento, California
49. Ministry of Agriculture, Fisheries and Food. *Toxic Chemicals in Agriculture and Food Storage.* London. 1961, p. 12
50. Ministry of Agriculture, Fisheries and Food. Leaflet APS/1, Part I
51. Ministry of Agriculture, Fisheries and Food. *Toxic Chemicals in Agriculture and Food Storage.* p. 13
52. Ward, Justus C. *American Journal of Public Health.* vol. 45, no. 6, June 1955, p. 725
53. Hayes, Wayland J. Jr. *Annual Review of Entomology.* vol. 5, 1960. p. 396
54. *Journal of the American Medical Association.* vol. 152, June 20, 1953. p. 709
55. World Health Organization. Technical Report Series No. 114, p. 11
56. Ministry of Agriculture, Fisheries and Food. Leaflet APS/1, Part III
57. Ministry of Agriculture, Fisheries and Food. *Poisonous Substances Used in Agriculture — Notes for Employers on Medical Supervision.* Nos. 1 and 2. December 1956
58. California. Department of Public Health. *Questions and Answers about Medical Supervision for Workers Using Organic Phosphate Pesticides.* 1962, pp. 1, 4, and 8
59. DeBach, Paul. *Handbook on Biological Control of Plant Pests.* Brooklyn Botanic Garden. 1960. p. 23
60. Stern, Vernon M.; Smith, Ray F.; van den Bosch, Robert; and Hagen, Kenneth S. *Hilgardia.* California Agricultural Experiment Station. vol. 29, no. 2, October 1959, p. 94
61. Fisher, Theodore W. *Handbook on Biological Control of Plant Pests.* p. 18
62. Turner, Neely. *Handbook on Biological Control of Plant Pests.* p. 55
63. Stern et al. *Hilgardia.* pp. 88, 89
64. Fisher, Theodore W. *Handbook on Biological Control of Plant Pests.* pp. 17, 18

BIBLIOGRAPHY

1. Arterberry, J. D., Durham, W. F., Elliott, J. W. and Wolfe, H. R., *Exposure to Parathion,* AMA Archives of Environmental Health, Vol. 3, 477-485 (Oct. 1961)
2. Barnes, J. M., Hayes, W. J. Jr., and Kay, Kingsley, *Control of Health Hazards Likely to Arise from the Use of Organo-Phosphorus Insecticides in Vector Control,* WHO Bull. 16, 41-61 (1957)
3. Batchelor, Gordon, S., Walker, Kenneth C. and Elliott, Joseph W., *Dinitroorthocresol Exposure from Apple-Thinning Sprays.* AMA Archives of Industrial Health, Vol. 13, 593-596 (June 1956)
4. Berry, Clyde M., *Agricultural Industry — the Changing Pattern,* American Journal of Public Health, Vol. 49, No. 5, 616-621 (May 1959)
5. Berry, Clyde M., *Health Hazards from Agricultural Chemicals,* Journal of the Iowa State Medical Society, 387-389 (July 1959)
6. Berry, Clyde M., *Health Hazards from Farm Chemicals,* paper presented at annual meeting of American Society of Agricultural Engineers, Columbus, Ohio (June 12-15, 1960)
7. Cann, Howard M. and Verhulst, Henry L., *Fatality from Acute Dinitrophenol Derivative Poisoning,* American Journal of Diseases of Children, Vol. 100, 947-948 (Dec. 1960)
8. Carpenter, C. P., Weil, C. S., Palm, P. E., Woodside, M. W., Nair, J. H. and Smyth, H. F. Jr., *Mammalian Toxicity of 1-Naphthyl-N-methylcarbamate (Sevin Insecticide)* Agricultural and Food Chemistry, Vol. 9, No. 1, 30-39 (Jan./Feb. 1961)
9. Derbes, Vincent J., Dent, J. H., Forrest, W. W., and Johnson, M. F., *Fatal Chlordane Poisoning,* Journal of the AMA, Vol. 158, 1367-1369 (August 13, 1955)
10. Durham, William F., *Health Hazards in the Use of Pesticides,* Proceedings of 1960 N. W. Perishable Loss Prevention Short Course (Feb. 17-18, 1960)
11. Durham, William F., Gaines, Thomas B., and Hayes, Wayland J. Jr., *Paralytic and Related Effects of Certain Organic Phosphorus Compounds,* AMA Archives of Industrial Health, Vol. 13, 326-330 (April 1956)
12. Chemical Specialties Manufacturers Association, *Compilation of Economic Poisons (Pesticides) Laws,* New York (June 1961)
13. Committee on Pesticides, *Pharmacology and Toxicology of Certain Organic Phosphorus Insecticides,* Journal of the AMA, Vol. 144, 104-108 (Sept. 9, 1950)
14. Committee on Pesticides, *The Present Status of Chlordane,* Journal of the AMA, Vol. 158, 1364-1367 (Aug. 13, 1955)
15. Committee on Pesticides, *Toxicology in Medical Curriculum,* Journal of the AMA, Vol. 152, 709 (June 20, 1953)
16. Committee on Toxicology, *Occupational Dieldrin Poisoning,* Journal of the AMA, Vol. 172, 2077-2080 (April 30, 1960)
17. Conley, Bernard E., *Incidence of Injury with Pesticides,* Journal of the AMA, Vol. 163, 1338-1340 (April 13, 1957)
18. Conley, Bernard E., *Morbidity and Mortality from Economic Poisons in the United States,* AMA Archives of Industrial Health, Vol. 18, 126-133 (Aug. 1958)
19. Decker, George C., *Pros and Cons of Pests, Pest Control and Pesticides,* World Review of Pest Control, Vol. 1, Part 1, 6-18 (Spring 1962)
20. Desi, I., Sos, J., Sule, F., and Markus, V., *Nervous System Effects of a Chemical Herbicide,* AMA Archives of Environmental Health, Vol. 4, 95-102 (Jan. 1962)
21. Doyle, Henry N., *Occupational Health on Farms,* Public Health Reports, Vol. 72, no. 2, 145-148 (Feb. 1957)
22. Edson, E. F. and Noakes, D. N., *The Comparative Toxicity of Six Organophosphorus Insecticides in the Rat,* abstract in Journal of Occupational Medicine, Vol. 3, no. 2, 98 (Feb. 1961)
23. Elliott, Joseph W., Walker, Kenneth C., Penick, Archie E., and Durham, William F., *Insecticide Exposure, a Sensitive Procedure for Urinary p-Nitrophenol Determination as a Measure of Exposure to Parathion,* Agricultural and Food Chemistry, Vol. 8, no. 2, 111-113 (March/April 1960)

24. Flanagan, Joseph E. Jr., *Labeling Legislation — a Summary Review of Recent Developments,* American Journal of Public Health, Vol. 50, no. 5, 637-641 (May 1960)

25. Frear, D. E. H., *Pesticide Handbook,* College Science Publishers, State College, Pa. (1961)

26. Fredriksson, Torsten, *Percutaneous Absorption of Parathion and Paraoxon,* AMA Archives of Environmental Health, Vol. 3, no. 2 (Aug. 1961)

27. George, John L., *The Pesticide Problem,* The Conservation Foundation, New York (1957)

28. Golz, Harold H., *Controlled Human Exposures to Malathion Aerosols,* AMA Archives of Industrial Health, Vol. 19, 516-523 (May 1959)

29. Golz, Harold H., and Shaffer, C. Boyd, *Toxicological Information on Cyanamid Insecticides,* American Cyanamid Co., New York (1960)

30. Great Britain, Ministry of Agriculture, Fisheries and Food, *Toxic Chemicals in Agriculture and Food Storage,* Report of the Research Study Group, H. M. Stationery Office, London (1961)

31. Great Britain, Ministry of Agriculture, Fisheries and Food, Leaflet APS/1, *The Safe Use of Poisonous Chemicals on the Farm* (April 1960)

32. Great Britain, Ministry of Agriculture, Fisheries and Food, Labour Supply Branch, *Poisonous Substances Used in Agriculture* — Notes for Employers on Medical Supervision, Nos. 1 and 2, (Dec. 1956)

33. Great Britain, Statutory Instruments 1956 No. 445, *The Agriculture (Poisonous Substances) Regulations, 1956,* H. M. Stationery Office, London (1959)

34. *Handbook on Biological Control of Plant Pests,* Brooklyn Botanic Garden (1960)

35. Hayes, Wayland J. Jr., *Diagnostic Problems in Toxicology,* AMA Archives of Environmental Health, Vol. 3, 49-56 (July 1961)

36. Hayes, Wayland J. Jr., *Pesticides in Relation to Public Health,* Annual Review of Entomology, Vol. 5, 379-404 (1960)

37. Hayes, Wayland J. Jr., Dixon, Ernest M., Batchelor, Gordon S., Upholt, William M., *Exposure to Organic Phosphorus Sprays and Occurrence of Selected Symptoms,* Public Health Reports ,Vol. 72, no. 9, 787-794 (Sept. 1957)

38. Hayes, Wayland J. Jr., Durham, William F. and Cueto, Cipriano, Jr., *The Effect of Known Repeated Oral Doses of Chlorophenothane (DDT) in Man,* Journal of the AMA, Vol. 162, 890-897 (Oct. 27, 1956)

39. *Hilgardia,* California Agricultural Experiment Station, Vol. 29, no. 2 (Oct. 1959)

40. Huguley, Charles M. Jr., Erslev, Allan J. and Bergsagel, Daniel E., *Drug-Related Blood Dyscrasias,* Journal of the AMA, Vol. 177, 23-26 (July 8, 1961)

41. Joslin, Eric F., Forney, Robert L., Huntington, Robert W. Jr., and Hayes, Wayland J. Jr., *A Fatal Case of Lindane Poisoning,* Proceedings of National Association of Coroners, Cleveland, Ohio, 53-57 (1958 Seminar)

42. Kleinman, Goldy D. and West, Irma, California State Department of Public Health, *Occupational Disease in California Attributed to Agricultural Chemicals,* statement presented at meeting of Special Committee on Public Policy Regarding Agricultural Chemicals, (Oct. 20, 1960)

43. Knapp, L. W. Jr., *Poison Information,* Institute of Agricultural Medicine, State University of Iowa, Iowa City, Iowa.

44. Lindquist, Arthur W., *New Ways to Control Insects,* Pest Control, (June 1961)

45. Long, Keith R. and Walden, John, *Preliminary Studies on Economic Poisons,* Bull. no. 4, Institute of Agricultural Medicine, State University of Iowa, Iowa City, Iowa. (Sept. 1958)

46. Malkinson, Frederick D., *Percutaneous Absorption of Toxic Substances in Industry,* AMA Archives of Industrial Health, Vol. 21, 87-99 (Feb. 1960)

47. Manufacturing Chemists' Association, Manual L-1, *Guide to Precautionary Labeling of Hazardous Chemicals,* Washington D. C. (1961)

48. National Agricultural Chemicals Association, *Law Chart — Laws Regulating Distribution and Sale of Agricultural Chemicals,* Washington D. C.

49. National Agricultural Chemicals Association, *Pesticide Use Law Chart,* Washington D. C., (Dec. 1959)

50. National Agricultural Chemicals Association, *Prototype of a Safety Education Campaign,* N. A. C. News, Vol. 20, no. 4, 2-6 (April 1962)

51. O'Brien, Richard D., *Toxic Phosphorus Esters,* Academic Press, New York and London (1960)

52. Pemberton, C. E., *History of the Entomology Department Experiment Station,* The Hawaiian Planters' Record, Vol. LII, no. 1, 53-90 (1948)

53. Pesticides Subcommittee of the Food Protection Committee, National Academy of Sciences — National Research Council, *Safe Use of Pesticides in Food Production,* publ. 470, Washington D. C. (1956)

54. Province of Saskatchewan, Canada, Department of Public Health, *Annual Report* 1960-61, 171

55. Quinby, Griffith E. and Lemmon, Allen B., *Parathion Residues as a Cause of Poisoning in Crop Workers,* Journal of the AMA, Vol. 166, 740-746 (Feb. 15, 1958)

56. Reeder, David H., *Organic Phosphate Insecticide Poisoning,* Journal of Occupational Medicine, Vol. 3, no. 3, 129 and 130 (March 1961)

57. *Safety Factors in Agricultural Aviation,* Agricultural Chemicals, 55 and 89 (May 1961)

58. Schwartz, Louis, *Skin Hazards from Fertilizers and Pesticides,* copy from Arhiv Za Higijenu Rada, Vol. 3, Zagreb 1952, Br. 3

59. Schwartz, Louis, Tulipan, Louis, and Birmingham, Donald J., *Occupational Diseases of the Skin,* 494 and 503, Lea and Febiger, Philadelphia (1957)

60. State of California, Department of Public Health, *Occupational Disease in California Attributed to Pesticides and Agricultural Chemicals 1959* (Feb. 1961)

61. State of California, Department of Public Health, *Occupational Disease in California Attributed to Pesticides and Other Agricultural Chemicals 1960* (Nov. 1961)

62. State of California, Department of Public Health, *Questions and Answers about Medical Supervision for Workers Using Organic Phosphate Pesticides,* (1962)

63. State of California, Department of Public Health, *Reports of Occupational Disease Attributed to Pesticides and Agricultural Chemicals 1958*

64. State of Oregon, House Bill No. 1208, Chemical Spray Applicators Law

65. Top, Franklin H., *Occupational Health in Agriculture,* AMA Archives of Environmental Health, Vol. 2, 150-154 (Feb. 1961)

66. Upholt, William M., *Evaluating Hazards in Pesticides Use,* Agricultural and Food Chemistry, Vol. 3, no. 12, 1000-1006 (Dec. 1955)

67. Upholt, William M., *Life-Saving Suggestions on Handling Parathion or TEPP,* Better Fruit Magazine (July 1956)

68. Upholt, William M., *Observe the Rule, An Ounce of Prevention,* American Fruit Grower, 39 and 40 (May 1955)

69. Upholt, William M., *Toxicology of Insecticides,* The Sanitarian, Vol. 20, no. 1, 23-27 (July-Aug. 1957)

70. U. S. Department of Agriculture, *Insects — the Yearbook of Agriculture 1952,* U. S. Govt. Printing Office, Washington, D. C.

71. U. S. Dept. Agr., Farmers Bull. No. 2062, *How to Spray the Aircraft Way,* U. S. Govt. Printing Office, Washington D. C. (1960)

72. U. S. Dept. Agr., Agricultural Research Service, *Insecticide Recommendations,* Agriculture Handbook no. 120, U. S. Govt. Printing Office, Washington D. C. (1962)

73. U. S. Dept. Agr., ARS, *Respiratory Devices for Protection Against Inhalation Hazards of Dust, Mists, and Low Vapor Concentrations of Certain Pesticides,* (March 20, 1961)

74. U. S. Dept. Agr., ARS, Service and Regulatory Announcements No. 166 (1958), *Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act* (Title 7, Ch. III, Pt. 362 of the Code of Federal Regulations)

75. U. S. Dept. Agr., ARS, Service and Regulatory Announcements No. 167 (1958), *Interpretations of the Regulations for the Enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act* (Title 7, Ch. III, Pt. 362 of the Code of Federal Regulations)

76. U. S. Dept. Agr., ARS, Interpretation 18, Revision II, *Interpretations of the Regulations* etc. . . . , Federal Register, 2267-2277 (March 9, 1962)

77. U. S. Dept. Agr., ARS, *Use of Diseases to Kill Plant Insect Pests,* ARS Special Report no. 22-74 (Oct. 1961)

78. U. S. Dept. Agr., Agricultural Stabilization and Conservation Service, *The Pesticide Situation for 1960-1961* (July 1961)

79. U. S. Department of Health, Education, and Welfare, Communicable Disease Center, *Clinical Memoranda on Economic Poisons,* Public Health Service Publication No. 476, U. S. Govt. Printing Office, Washington D. C. (1956)

80. U. S. Dept. of HEW, National Office of Vital Statistics, *Deaths from Accidental Poisoning by Pesticides: U. S., Selected Years 1946-59* (May 1, 1961)

81. U. S. Department of Labor, Bureau of Labor Standards, *Agricultural Workers and Workmen's Compensation,* Bull. 206, U. S. Govt. Printing Office (1959)

82. U. S. Dept. of Labor, Bur. of Lab. Standards, *Pesticides,* Safety Standards, 7, 8, 9, 19, 20 (Jan.-Feb. 1960)

83. U. S. Dept. of Labor, Bur. of Lab. Standards, *State Workmen's Compensation Laws,* Bull. 161, U. S. Govt. Printing Office, Washington D. C. (1960)

84. U. S. Federal Aviation Agency, *Aircraft in Agriculture 1959,* U. S. Govt. Printing Office, Washington D. C. (June 1961)

85. U. S. Laws, *Federal Food, Drug, and Cosmetic Act* (Appr. June 25, 1938, 52 Stat. 1040-50 c. 657, Publ. No. 717, 75th Congr.)

86. U. S. Laws, *Federal Insecticide, Fungicide, and Rodenticide Act* (Appr. June 25, 1947, 61 Stat. 163-73 c. 125, Publ. No. 104, 80th Congr.)

87. U. S. Laws, *Public Law No. 518,* 83rd Congress (amended Federal Food, Drug, and Cosmetic Act in 1954)

88. U. S. Laws, *Public Law No. 86-139,* 86th Congress (amended Federal Insecticide, Fungicide, and Rodenticide Act in 1959)

89. van den Bosch, R., and Stern, V. M., *The Integration of Chemical and Biological Control of Arthropod Pests,* Annual Review of Entomology, Vol. 7, 367-386 (1962)

90. Verhulst, H. L. and Page, L. A., *A New Agent in Parathion Poisoning,* Journal of New Drugs, Vol. 1, no. 2 (March-April 1961)

91. Ward, Justus C., *Public Acceptance of Pesticides Depends on Safe Use,* Pest Control (Jan. 1962)

92. Ward, Justus C., *Toxicity Criteria Used in Judging the Labeling of Pesticides,* American Journal of Public Health, Vol. 45, no. 6, 723-727 (June 1955)

93. Wolfe, Homer R., *Health Hazards in the Agricultural Use of Economic Poisons,* Washington State Weed Conference Proceedings, 3-8 (Nov. 1960)

94. Wolfe, Homer R., Durham, William F., Walker, Kenneth C., and Armstrong, J. F., *Health Hazards of Discarded Pesticide Containers,* AMA Archives of Environmental Health, Vol. 3, no. 5 (Nov. 1961)

95. World Health Organization, Bull. 20 (1959)

96. World Health Organization, Tech. Rept. Ser. No. 110, *Expert Committee on Insecticides — Sixth Report* (1956)

97. World Health Organization, Tech. Rept. Ser. No. 114, *Toxic Hazards of Pesticides to Man* (1956)

98. World Health Organization, Tech. Rept. Ser. No. 191, *Expert Committee on Insecticides — Tenth Report* (1960)

99. Young, John, West, Irma, and Loretz, Wayne, *Public Health Hazards in Use of Agricultural Chemicals,* California's Health, Vol. 12, no. 17, 129-133 (March 1, 1955)

The Regulation of Pesticides in the United States

U.S. DEPARTMENT OF AGRICULTURE

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
FOOD AND DRUG ADMINISTRATION

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March 1968

INTRODUCTION

The United States is committed by law, policy, and the traditions of many decades to assure that the food supply of the Nation is safe, clean, and wholesome. The United States is committed to full enforcement of these laws, and accordingly, has developed criteria and protocols that are effective, workable, and enforceable. Within this primary goal, the United States seeks means that will permit achievement with minimal dislocation of production or trade. But under no circumstances will hazard to people or to the environment be countenanced to serve economic goals.

The wholesomeness of any food supply depends in part on the quality of the total environment -- the soil, water, and air in which the food is grown, processed, and consumed. Acute contamination of these basic natural resources by pesticide residues and other pollutants can affect not only the safety of food products, but also other environmental values such as human water supplies, wildlife preservation, and outdoor recreation. The United States is actively seeking to protect and manage these resources in the interest of greater safety and human welfare.

In the highly interrelated, interdependent world of modern technology and trade, the challenge of protecting crops and livestock from insects, diseases, weeds, and other pests without hazard to people, animals or their environment requires the combined and sustained efforts of scientists, technicians, and administrators; of producers, processors, and distributors; of industry and government; and of nations working together to establish and administer sound, acceptable standards of food safety and environmental quality.

The following information provides a full statement of the authorities on which the U.S. pesticides regulations are based; the division of responsibilities between the Department of Agriculture and the Department of Health, Education, and Welfare; the criteria for registration and establishment of tolerances; the research, action, and education programs related to pesticides; and the existing levels of pesticide residues in the United States.

AUTHORITY AND RESPONSIBILITIES

The statutory authority for the regulation of pesticides and pesticide residues entering interstate commerce has been established by the Congress of the United States. Under these statutes, the responsibility for registration of pesticides and pest control materials has been delegated to the U.S. Department of Agriculture. The establishment of tolerances for pesticides in or on human food and animal feeds has been delegated to the Food and Drug Administration of the Department of Health, Education, and Welfare.

When the proposed use of a pesticide will result in residues on a food or feed crop, the registration by the Department of Agriculture is not granted until a tolerance has been established by the Food and Drug Administration.

The regulation of pesticides and pesticide residues by the Federal Government encompasses those pesticides or residues involved in shipment in interstate commerce. Pesticides and food supplies produced and used within a single State are under the jurisdiction of that State. The various Federal agencies are working closely with their counterparts in the States in the field of pesticide regulation and control.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act was established by law on June 25, 1947, to regulate the marketing of economic poisons and devices. This Act was amended in 1959 and in 1964.

The term "economic poison" is defined as "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insects, rodents, fungi, weeds, and other forms of plant and animal life or viruses, except viruses on or in living man or other animals which the Secretary (of Agriculture) shall declare to be a pest, and any substances or mixture of substances intended for use as a plant regulator, defoliant, or desiccant."

Under the Act, no pesticide chemical may be legally shipped in interstate commerce for general use until it has been shown to be safe when used as directed and effective for the purpose claimed on the label. Also, any residues that may remain on food or feed must not exceed the safe tolerance level established by the Food and Drug Administration.

The Act prohibits the shipment in interstate commerce of products which are not registered or are adulterated or misbranded. Products which are in violation of the Act may be seized and criminal action instituted against the shipper of such products.

Food, Drug, and Cosmetic Act

The establishment of tolerances for pesticides on or in food and feedstuffs is provided for in the Pesticide Chemicals Amendment and Food Additives Amendment of the Food, Drug, and Cosmetic Act (Sections 408 and 409) administered by the Food and Drug Administration.

The paramount purpose of this Act is to assure the safety of the Nation's food supply; to require that the industry promoting the use of the pesticide chemical prove that the residues remaining on the food are safe for the consumer; and to require Government clearance before the pesticide is used.

The Act provides for seizure and destruction of agricultural commodities that contain pesticide residues in excess of established tolerances. Where no tolerance has been established, commodities carrying residues in excess of established working levels are also subject to seizure and destruction. The Act also provides for criminal penalties for violations and for the use of a legal injunction.

The Act outlines in general terms the data and information to be furnished and the procedure to be followed for obtaining a pesticide tolerance. Additional procedures and more specific data requirements in the regulations insure that food safety requirements are met prior to establishing a tolerance.

Meat and Poultry Inspection Acts

Federal inspection for wholesomeness of all meat derived from cattle, sheep, swine, goats, and horses shipped in interstate and foreign commerce is required under the Meat Inspection Programs. All poultry products shipped in interstate and foreign commerce also require Federal inspection. The importation of meat is prohibited unless such meat also complies with the regulations governing the Federal meat inspection programs.

The 1967 Federal Wholesome Meat Act has extended the essential elements of the Federal Meat Inspection program to livestock, meat, and meat products within intrastate commerce. It also provides assistance in improving State systems, and authorizes intervention in intrastate plants where health hazards may be involved.

The Congress of the United States has assigned responsibility for promulgating regulations and administering the Federal Meat Inspection program to the Secretary of Agriculture.

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CRITERIA FOR PESTICIDES REGISTRATION AND ESTABLISHMENT OF TOLERANCES

Department of Agriculture

Registration requirements

1. Criteria for establishing registration

The applicant for registration must furnish documented proof to support the claims made for the proposed product. Data required to support registration usually include the following:

A. Toxicity tests

Toxicity tests on the proposed formulation must be conducted to show that the directed use of the product would not be injurious to exposed man or beneficial animals when warnings and cautions are carefully followed. The extent of toxicological data required will vary with the nature and proposed use of the product. Toxicity studies normally include:

(1). Safety data

a. Acute mammalian studies

1. Oral
2. Dermal
3. Inhalation
4. Eye and skin irritation

b. Subacute studies

1. Oral - 90 days
2. Dermal - 21 days
3. Inhalation - 14 days

c. Other studies which may be required include:

1. Neurotoxicity
2. Teratogenicity
3. Effects on reproduction
4. Synergism
5. Potentiation
6. Metabolism
7. Avian and fish toxicity

(2). Physical-chemical properties

a. Boiling point

b. Flash point

c. Physical state

d. Density

e. Vapor pressure

f. Solubility

g. Stability

B. Efficacy data

Biological tests under field and laboratory conditions must be conducted to determine if the product will control the pests named on the label, when used as directed, without causing significant adverse effects to the crop or property being treated. The following factors are considered in determining efficacy:

(1). Effectiveness
The product must be shown to be effective for the intended purposes when used as directed.

(2). Phytotoxicity

(3). Translocation within the plant or animal being treated

(4). Persistence in soil, water, or plants

(5). Compatability with other chemicals

(6). A thorough search and evaluation of the data submitted as well as other applicable data are made. After such search, the Department of Agriculture specialists concerned with efficacy determine whether or not the proposed formulation would be useful for the intended use without causing significant adverse effects when applied according to the proposed labeling.

2. General labeling requirements

A. Name of product

B. Name and address of manufacturer, registrant, or person for whom manufactured

C. Net contents

D. Ingredient statement
Name and percentage (by weight) of each active ingredient, and total percent of inert ingredients, or name of each active and each inert ingredient in descending order, and relative abundance in each category and the total percentage of inert ingredients

E. Warning or caution statement

The label of any economic poison must show warnings pertaining to:

(1). Ingestion

(2). Skin absorption

(3). Inhalation

(4). Flammability or explosion

The required signal word such as "DANGER," "WARNING," or "CAUTION," and the statement "Keep Out of Reach of Children" must appear on the front panel and meet the minimum type size requirements. The front panel of the label of economic poisons which are highly toxic to man must show:

(1). "POISON" in red on a contrasting background

(2). "DANGER"

(3). Skull and crossbones

(4). Statement of antidote, including directions to call a physician immediately (in immediate vicinity of skull and crossbones and "POISON")

F. The registration number assigned to the product

G. Directions for use which are adequate to protect the public (optional on label -- may appear on accompanying printed or graphic matter)

3. Other required information

A. Data to support any or all claims on the labeling

B. A complete statement of the composition of the product, including the the percentage by weight of each of the active and inert ingredients, if such information does not appear on the label

C. Any pertinent information about inert ingredients

D. Any other information pertaining to physical or biological properties of the product, etc.

4. Review by other agencies

Petitions for registration filed with the Department of Agriculture are reviewed and commented on by other Departments of the Federal Government. The Department of the Interior reviews all petitions for registration

whose use patterns may have an impact on fish or wildlife. The Public Health Service of the Department of Health, Education, and Welfare reviews all petitions from the standpoint of human safety. The comments of these two agencies are forwarded to the Department of Agriculture and are considered before registration is granted or refused.

Opinion on adequacy of residue data and proposed tolerance

An analytical method suitable for enforcement purposes must be provided with the petition, when suggested use patterns will result in residues of the chemical on food or feed. The analytical method and the residue levels presented in the petition are evaluated and an opinion on whether the proposed tolerance reasonably reflects the residue is forwarded to the Food and Drug Administration.

The review includes consideration of the residues of the parent chemical metabolites, and the conversion products that may be formed. Residues occurring in plant parts other than the principal raw agricultural commodity are also considered.

Manpower and funds on criteria and registration

There are 258 people engaged in the work of the Pesticides Regulation Division, 115 in registration and 143 in enforcement. The Division is funded at $3,500,000.

Food and Drug Administration

If the product is proposed for use in a manner which is likely to result in residues in or on food or feed, it is not registered by the Department of Agriculture until a tolerance or exemption has been granted by the Food and Drug Administration.

The determination of the safety of a tolerance is a scientific judgment and cannot be derived from any arbitrary mathematical calculation. This judgment involves consideration of the "no-effect" levels demonstrated in the experimental animals, the cumulative potential, the metabolic data, the maximum contribution to the diet that could be expected if all commodities for which tolerances are sought bore residues at the tolerance levels taking into account any reduction in residues accomplished in preparing the food ready to eat, the probable exposure to other similar toxicants, and species differences in translating the animal data to possible effects on man. An adequate margin between the tolerance level and the "no-effect" level in the experimental data is required, taking into consideration the proportion of the diet involving crops on which residues might be expected.

Tolerances established under Section 408 of the Food, Drug, and Cosmetic Act are established on raw agricultural commodities, not on processed foods. If the residues remaining in a processed food have been removed to the extent possible in good manufacturing practices and do not exceed the tolerance on the raw product, the processed product complies with the law. In general,

the residues in processed foods are a fraction of the amount permitted on the raw agricultural commodity. To cover the residues of pesticides applied to or concentrating in processed foods, tolerances may be established under Section 409 of the Act, the Food Additives Amendment. However, the major uses of pesticide in the United States are on raw agricultural commodities, and the overwhelming majority of established tolerances are on these products.

Ideally, the tolerances on pesticide residues should apply to the ready-to-eat food on the dinner plate because it is the quantity of pesticide actually consumed that can have health significance. However, tolerances established at this point in the food chain would not be practical. Therefore, a point in the distribution system has been selected where meaningful corrective action can be taken to prevent consumption of unsafe amounts of pesticide chemicals. The tolerance concept does not anticipate, as a practical matter, that all foods will contain residues of all chemicals as high as the established tolerance level, or even that all of a single food will always contain a residue at the tolerance level.

Data requirements for pesticide tolerances

The criteria and data requirements for establishing tolerances are presented below. Although these are described in detail, some flexibility is permitted in practice. The basic requirement is that the data and other information furnished, when evaluated as a whole, will establish the safety of the proposed pesticide tolerance. This judgment is made by toxicologists qualified by training and experience to evaluate the safety of pesticide residues in food.

1. Chemical data

The chemical data in pesticide petitions must meet two major requirements.

A. The residue data must delineate the identity and magnitude of the residues and must show that, under the proposed conditions of use, the proposed tolerance is suitable (i.e., will not be exceeded but is no higher than necessary).

B. The analytical methods used to obtain the residue data must be valid and must afford a measure of the total toxic residue. A suitable method must be furnished for enforcing the proposed tolerance.

The following listing represents items of information usually needed to arrive at a scientific judgment as to whether these requirements have been met:

Pesticide chemical: The identity and complete composition, including minor components and impurities, as well as accepted chemical (or biological) and common names are required. Specifications must be furnished if required to establish identity or to limit impurities.

Chemical, physical, and biological properties pertinent to the evaluation of the efficiency of analytical procedures and the nature and stability of residues must be reported.

Conditions of use: Complete proposed directions for use must be included. Proposed limitations and restrictions, such as against feed use of by-products, must be reasonable, practicable, and in conformity with accepted practices.

Analytical methods: The petition must present or refer to a method suitable for enforcing the proposed tolerance. This method is added to the compendium of pesticide analytical methods, the FDA Pesticide Analytical Manual. In some instances residue data may be obtained by methods not suitable for regulatory purposes. It is desirable to confirm residue results by using more than one method (i.e., by a specific method and one or two appropriate general methods). Descriptions of methods must be sufficiently detailed and well organized to be followed by analysts not familiar with the procedures.

General requirements for methods: Extraction and clean-up procedures must be efficient in removing and recovering residues from samples.

Methods must be validated by an adequate number of blanks (untreated crops) and recoveries on an adequate representation of the commodities involved. Blank values must be reasonably low in relation to the proposed tolerance. Recoveries must be at appropriate fortification levels in relation to the proposed tolerance and must be reasonably quantitative.

Sensitivity, accuracy, and precision must be satisfactory in relation to the proposed tolerance and to the toxicity of the pesticide chemical.

Additional requirements for regulatory methods: Must be sufficiently specific to identify and measure residues in the presence of residues of other pesticides which could reasonably be expected to be present on the same commodities.

Must be reasonably rapid and not require "exotic" (unavailable) equipment or reagents.

Must not require use of untreated crop samples for blanks or for internal standards.

Must be capable of giving satisfactory results when employed by regulatory laboratories. Method trials in at least two FDA laboratories are made to determine suitability for regulatory purposes.

Samples for analysis: Samples used must reflect the proposed conditions of use, including maximum usage, with respect to dosage, timing, number of applications, etc. Samples reflecting exaggerated conditions of use are also of value. Conditions under which samples were field treated, including method of application, must be reported.

Samples must reflect adequate geographical distribution (i.e., major growing areas), and adequate representation of types of crops for which tolerances are proposed.

The time between sampling and analysis and the conditions under which the samples were kept must be stated. Samples must be kept in storage for as short a time as possible; if crop or extract samples were stored before analysis, evidence must be given to show that the residues are stable under such conditions.

Methods of preparing crop samples for analysis (i.e., trimmed, washed, brushed, peeled, hulled, etc.) must be reported. If these operations are necessary to reduce residues within the proposed tolerance, they must reflect commercial practice in preparation of the crop for shipment in interstate commerce.

Analytical results: In all cases individual results, not just averages, must be reported. Any corrections made for blanks and recoveries must be explained. There must be an adequate number of results on each commodity.

The identity and magnitude of the residue under the proposed conditions of use must be established. Toxic residual metabolic, degradation, or other conversion products must be identified and measured.

Data showing whether the pesticide is systemic (i.e., is translocated within the plant or animal) must be presented.

Data must be included to show the rate at which the residue dissipates on the crops involved.

Where it is pertinent, results must include data on the distribution of the residue (for example, between peel and pulp) and evidence as to whether the residue is reduced when the raw commodity is prepared for market (by washing, trimming, brushing, etc.) in order to judge the amount of residue that is likely to remain on the edible portion of the commodity.

Where pertinent to the proposed usage, data must be presented on the accumulation, persistence, and identity of residues in soils, and the transfer of such residues to crops likely to be grown in the same soils.

Where pertinent, evidence must be presented to show whether residues concentrate at a higher level or undergo chemical change in processed foods or feeds, including edible by-product food or feeds.

In certain cases, it may be necessary to provide data showing the effect on residues of standard operations of preparing the food for consumption (i.e., cooking, etc.).

If feed and forage items, including feed by-products, are involved, there must be a basis for determining whether residues will transfer to food products such as meat, milk, and eggs. If so, the identity and magnitude

of such transferred residues must be established and suitable tolerances proposed.

The guidelines for the review of the chemical data in petitions which propose negligible residue tolerances are generally the same as those described above, except that: (a) tissue residue studies on laboratory animals may be accepted to show the likelihood that the pesticide use will result in residues in meat and milk, and (b) tolerances may be established on the basis of a group of crops rather than on each crop individually. A negligible residue tolerance is a tolerance that has been established to provide a basis for registered uses which previously have been accepted on the basis that "no residue" or a zero residue will be present in the treated crop at the time of harvest. Based on a recommendation from a committee of the National Academy of Sciences-National Research Council, FDA and USDA have abandoned the concept of "no residue" or zero tolerance registrations of pesticides as far as possible (for example, only zero tolerances can be established for carcinogens), and have replaced "no residue" and zero tolerances with small finite tolerances (i.e., negligible residue tolerances). Regulatory problems had arisen because extremely sensitive analytical methods had been developed which indicated that many of these older "no residue" uses did result in low-level residues. Where a registration had been granted on a "no residue" or "zero-tolerance" basis, 1-year extensions of registration have been granted under certain conditions. These extensions were granted when the registered use pattern indicated that there would remain only low-level residues, which are generally recognized as of no toxicological significance. During the 1-year extension, the petitioner is expected to document the level and toxicological safety of the residues for the establishment of the negligible residue tolerance.

In specified instances, a temporary tolerance is established to permit experimental pesticide field trials, on a limited scale, conducted in accordance with and required by a temporary permit issued by USDA. The purpose of these trials is to determine the usefulness of the pesticide without having to destroy the crop.

2. Toxicological data

The requirements for the two major types of tolerances--for negligible residues and for residues (higher levels)--are outlined as follows:

A. It has been determined that a negligible residue tolerance is sufficiently limited by the magnitude of the residue, extent of use, and mode of use so that the levels of ingestion which result are considered to be of little or no toxicological significance. The safety factor is usually about 2,000 based on 90-day studies; that is --

$$\frac{\text{Quantity of pesticide that produces "no effect" in the most sensitive animal tested}}{\text{Quantity of pesticide expected in the diet of man}} = 2{,}000$$

Quite often, such tolerances reflect the sensitivity of the method. For such a negligible residue tolerance, the basic requirement is data from two 90-day (subacute) animal feeding studies. The term "basic requirement" is used because acute data for significant metabolites may indicate need for further studies, or results of the basic 90-day studies may call for further work, or knowledge of the toxicity of the general class of compounds involved may result in requests for specific kinds of toxicological data.

B. A tolerance for residues in excess of negligible residues will require the following data:

(1). Acute toxicity

a. LD_{50} in at least two species of animals
b. A description of the signs of toxicity

(2). Short-term toxicity (subacute toxicity)

a. At least two species, one a non-rodent
b. Duration, 90 days
c. At least three dosage levels plus a control group; one dosage level should be toxic
d. When 90-day studies are designed to continue for long-term toxicity studies, sufficient animals must be started to supply the required number for the long-term studies.
e. Observations: growth, food consumption, general appearance and behavior, mortality, organ weights, clinical-laboratory tests (blood and urine, organ function, enzymatic and metabolic), and gross and microscopic examinations. All animals dying before termination should be examined grossly and microscopically. All tumors should be recorded and examined microscopically.
f. In the case of organo-phosphorus and carbamate pesticides, cholinesterase inhibition and demyelination studies must be made.

(3). Long-term toxicity (chronic toxicity)

a. At least two species, one a non-rodent
b. Duration, usually 2 years
c. At least three dosage levels plus a control group; one dosage level should be toxic
d. The groups at the start of the experiment should be sufficiently large to assure an adequate number of survivors at termination. For rodents this may vary from strain to strain so that numbers to be used are contingent on the judgment of the investigator.
e. Observations: growth, food consumption, general appearance and behavior, mortality, organ weights, clinical-laboratory tests, gross examination of animals throughout

experimental period and tissues at autopsy, and comprehensive microscopic examination of tissues. Animals dying before termination should be examined grossly and microscopically. All tumors should be noted and examined microscopically.

(4). Biochemical data

a. Data from at least two species of animals
b. Observations: absorption, distribution, metabolic transformation, elimination, possible accumulation, and the effect of enzymes which should be examined because of the nature of the chemical under study.
c. Information on metabolism of pesticides and their other conversion products in treated plants. At least acute and short-term toxicity data on the significant plant metabolites or other conversion products. If the conversion products are different from metabolites of the test animals, long-term toxicity data on the pesticide metabolites or other conversion products may be required.

(5). Reproduction studies

a. At least one species, preferably two
b. At least two dosage levels plus a control group
c. One dosage level should be definitely toxic; one should have no effect.
d. Usually three successive generations in the rat; two generations are satisfactory if the results are conclusive.
e. Preferably two litters per generation
f. Both the males and females should be treated for 60 days prior to breeding. The second and third generations are treated from weaning throughout the breeding period.
g. Observations: fertility, length of gestation, live births, still births, survival at 4 days and at weaning, sex of newborn and of weanlings, body weights, gross abnormalities, and microscopic and sketetal examination of young in last generation.

(6). Data on man

a. From industrial exposure
b. From accidental poisonings and suicides
c. From controlled experiments in special cases
d. Biochemical data of the type indicated under (4) b. above are particularly useful.

(7). Any additional studies that might be indicated by results from studies (1) to (6) above.

3. Discussion

Data requirements for tolerances are subject to continual review in light of new scientific data and information, specifically advances in scientific knowledge about the criteria for the evaluation of the safety of chemicals in food. The data requirements outlined above are the present requirements. Earlier tolerances were established on the basis of lesser data, but any deficiences are being remedied before tolerances on additional crops are established. For example, the requirement for reproduction studies was instituted in 1963.

There may be some misconception as to the method used to arrive at a tolerance on a raw agricultural commodity. First, and of essential importance, is that the tolerance must be safe for the consumer if all of this particular raw food did bear residues at the tolerance level. However, we do take into account the patterns and modes of consumption - proportion of the food consumed in the raw state, as is, as compared with the proportion consumed in the processed state where a reduction of residues may occur. It should be emphasized that there must be an adequate margin of safety between the "no-effect" level in the most sensitive test animal and the level of residue likely to be ingested by the consumer.

Secondly, the tolerance does not reflect the average residue on the raw agricultural commodity; it reflects the maximum residue which will remain on the treated crop as harvested and shipped when the directions for use are followed, if such maximum residue is safe.

Pesticide surveillance and enforcement data clearly show that only a small percentage of the samples contain amounts of pesticide residues that actually approach the tolerance levels. This is to be expected, since not all crops need treatment. Tolerances are established to cover the residues (if they are safe for the consumer) that the grower will incur under the most strenuous conditions of pesticide use, i.e., at the maximum dosage, the maximum number of applications to the crop, and as close to harvest, as the label permits. Not all growers in a specified geographic area and certainly not all growers in other geographic growing areas of the country would find their crops attacked by the same pests at exactly the same stages of growth; even if this situation did occur, some of the growers would undoubtedly choose another equally effective pesticide. The U.S. tolerances have been established primarily to protect the consumer. Samples analyses show that this purpose is being achieved, and at the same time, the grower is permitted to use chemical tools effectively to produce a wholesome and abundant food supply.

Thirdly, since the tolerance is established on the raw agricultural commodity, it does not realistically reflect the residue on the food as eaten except in special cases. Data clearly demonstrate that pesticide residues are substantially reduced by the various processing operations employed in preparing food for consumption (ready-to-eat): the milling of grain, the washing operation in some cases, the peeling of fruits and vegetables, the removal and discard of outer leaves of leafy vegetables, cooking, or canning.

Finally, the tolerance will not be set higher than the level reasonably required to cover the residue likely to result from the proposed pesticide usage even though the animal feeding studies may indicate that a higher level is safe. For example, if 10 p.p.m. of pesticide X would be safe as gauged by all the animal studies but the maximum residue incurred by the proposed use will not exceed 1 p.p.m., on the raw agricultural commodity, the tolerance will be established at 1 p.p.m. It is our considered purpose to minimize the exposure of the consumer to pesticide residues in his food supply, all in the interest of safety.

The Granting of a Registration

If Department of Agriculture requirements are met and FDA establishes the tolerance, registration is granted.

If the safety data do not justify the proposed tolerance, a lower tolerance or a zero tolerance may be established. The Department of Agriculture then grants a registration on the basis of the tolerance established by the Food and Drug Administration, provided the pesticide is useful under the conditions required by the lower tolerance.

In the past, when a pesticide was registered for use on a food or feed crop on the basis of a zero-tolerance or on a no-residue basis, it meant that the directed use would not leave residues on the harvested food at levels which could be detected by chemical analysis. This has often meant that the development of a more sensitive method invalidated the zero-tolerance or no-residue acceptance. This procedure has been modified in favor of registration on the basis of finite tolerances for all uses involving food or feed where there is a reasonable expectation of some residue, however small, as provided for in the joint statement of April 13, 1966, by the Departments of Agriculture and Health, Education, and Welfare. Uses involving no reasonable expectation of residues in the food are usually designated "nonfood" uses.

RESEARCH, ACTION, AND EDUCATION PROGRAMS

Research

The formulation and enforcement of adequate pesticide regulations, like any other regulation, must be firmly based on research and use experience. Within the United States, as in many countries, industry, educational institutions, and State and Federal laboratories have utilized their combined efforts to develop, test, evaluate and control chemical methods for pest control.

Department of Agriculture

The U.S. Department of Agriculture conducts, and otherwise supports, a comprehensive, forward-looking, in-depth pesticides pest-control program involving research, regulation, pest control, monitoring, information, and education. The ultimate objective is to develop and encourage the use of those means of effective pest control which provide the least potential hazard to man, animals, and their environment.

In addition to its own research programs, the Department also supports research on pests and their control in private and public agencies through contracts and grants. Major grant funds are allocated to State agricultural experiment stations and schools of forestry through procedures authorized by Congress under the Hatch and McIntire-Stennis Acts.

A 1966 study by State and Federal Governments of 91 areas of agricultural research included a determination of the number of scientist-man-years and the funding associated with this research. Seven areas of agricultural research are of particular interest to those concerned with pest control.

The total scientist-man-years and the funding of the research projects in fiscal year 1967 are indicated in Table A. The data represents the combined efforts of the State agricultural experiment stations, schools of forestry, and the Department of Agriculture.

Table A

Total Scientist-Man-Years and Funding in State Agricultural Experiment Stations, Schools of Forestry, and U. S. Department of Agriculture

Research Area	Fiscal Year 1967	
	Total Scientist-Man-Years	Total Funding
Insect pests of fruit, vegetables, field crops, livestock, poultry, and forests	844	$33,725,000
Diseases of fruit, vegetables, field crops, livestock, poultry, and forests	1,229	53,550,000
Weeds and other hazards to fruit and vegetable crops	185	6,560,000
Internal parasites of poultry and meat animals	92	4,513,000
Protection of poultry and livestock from toxic chemicals, poisonous plants, and other hazards	48	2,397,000
Insure food products free from toxic residues	129	5,600,000
Control of insect pests of man and his belongings	67	2,655,000
Total	2,594	$109,000,000

The research and action programs related to pesticides and pest control, supported by the Department of Agriculture have been associated with certain general objectives. A summation of these objective-related research and action programs is indicated in Table B. The funding for this Department research in fiscal year 1967 has also been included in Table A under the appropriate research areas.

Table B

Expenditures by the United States Department of Agriculture during Fiscal Year 1967 for Pesticide-Related Research and Action Programs

Pesticide Related Research on:	Expenditures: Fiscal Year 1967
Fundamental biology	$16,307,000
Improved means of nonpesticidal control	23,702,000
Improved pesticide use patterns	12,937,000
Toxicology, pathology, metabolism and fate of pesticides	4,942,000
Action Programs	
Monitoring impact of pesticides on the environment	886,000
Regulation of pesticides	3,284,000
Information, education, and coordination	4,787,000

The prime objective of the research programs is to develop safer, more efficient, and more economical means of pest control, to provide man with an ever-increasing supply of food and fiber, and to protect the environment from avoidable contamination. The benefits of research also provide an ever-expanding baseline of knowledge for the evaluation of the safety of pest control procedures.

Food and Drug Administration

FDA's research activities in pesticides are designed to support and strengthen its capability to establish and enforce pesticide tolerances. These research activities fall into two major areas: chemical research and biological research.

FDA's chemical research on pesticide residues in foods includes: (1) establishing the chemical identity of the residue, including significant conversion products; (2) developing, improving, and validating methodology for measuring the amount of such residue; and (3) occasional checking on the validity of data submitted in petitions.

The development of adequate methodology for the analysis of pesticide residues is a continuing problem and requires a major share of the research effort. Multiple residue detection techniques, which will determine many pesticides simultaneously, have simplified the regulatory analytical problem but they have greatly complicated the research and development problem. It is frequently very difficult to fit a pesticide into a multiple residue detection scheme without complicating the scheme for the chemicals for which it was originally developed. Many large groups of pesticides in increasing use, such as carbamates, have not yet been fitted into such techniques. Furthermore, multiple residue detection techniques alone do not establish unequivocally the identity of the pesticide residue, particularly if artifacts or interferences are encountered. Identity of the residue must be confirmed by another method and a variety of such confirmatory methods must be available for the many different pesticides in use. In addition to the adaptation of present methods to new chemicals and the development of new methods, improvements in sensitivity, efficiency, rapidity, and simplicity of existing methods are always needed to enable the Food and Drug Administration to improve the effectiveness of its tolerance enforcement program.

Analytical methods should be available for the initial identification and measurement of residues on objective samples of unknown treatment history. This is the reason that emphasis has been placed on the development of multiple residue detection techniques such as gas chromatography. Methods of this type in the United States have been developed almost solely through the research program of the Food and Drug Administration. By such methods, it has been possible for FDA to analyze about 25,000 food crop samples annually for a variety of pesticides, equivalent to perhaps a million individual analyses per year.

In many cases, the residue from use of a pesticide comprises not only the chemical applied, but also toxic degradation or other conversion products which may be formed on exposure to light and weathering. Heptachlor on plants and in animals converts to the equally toxic heptachlor epoxide. Dieldrin has been reported to give a toxic photo-decomposition product. Metabolic products may be formed in animals and deposited in edible tissues or milk. Phosphate pesticides are especially prone to form toxic conversion products. This phase of the research program must insure that the composition of the residue has been established so that the analytical methodology developed will measure all toxicologically significant residual chemicals.

The biological research program is directed toward evaluating the hazards of pesticide residues and their conversion products by acquiring information on the effects of these materials on animals and man. This research work is applied research directed to the support of establishing pesticide tolerances and to the development of scientific facts to furnish an increasingly sound basis for FDA policies. The research effort includes the following areas: The development of data on new types of pesticides to facilitate FDA guidance of commercial work for support of petitions; a more detailed examination of specific toxic effects for their impact on safety evaluation; examination and development of new toxicological methods for use in evaluating safety; and

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resolution of conflicting or equivocal data for a sounder evaluation of safety of pesticide residues in foods. This information results in the ability to establish safe tolerance levels and enforcement policies.

In all cases, measurable parameters are desired from animal experimentation which may prove useful for logical prediction of toxicity in man. It is highly desirable to determine how man handles the toxic substances so that an animal species can be sought which will provide corresponding data useful in safety interpretation.

In brief FDA biological research includes:

(1) Study of the physiological effects and metabolism of pesticides in biological systems, including the metabolic fate of the compounds, their biochemical reactions, the nature of the metabolic pathways, and an evaluation of their effects in terms of toxic action;

(2) Performance of toxicity studies of pesticides as a method for determining safe tolerance levels;

(3) Development of data on the direct effect of pesticides on man.

FDA's research programs on pesticides will require 152 man-years and $2,298,000 in fiscal year 1968 (July 1, 1967 to June 30, 1968). These funds are nearly 43 percent of the $5,384,000 total FDA expenditure on pesticide programs planned this year. All FDA pesticide program activities and resources allotted to them are summarized for comparative purposes in Table C.

Table C

Summary of FDA Activity on Pesticide Programs, Fiscal Year 1968

Activity	Man-Years	Dollars
Total, all activities	405	$5,384,000
Research Toxicity, metabolism, fate of residues on foods, methodology for pesticides and metabolites, etc.	152	2,298,000
Standards Evaluation of pesticide petitions, establishment of tolerances, etc.	31	358,000
Surveillance 2,000 investigations in growing areas, 12,000 domestic market samples examined, 2,250 import samples examined, 30 market basket surveys involving 12,300 sample tests (total diet studies), etc.	191	2,266,000
Compliance Regulatory followup on products with excessive residues, industry workshops on legal requirements, etc.	16	200,000
Information Consumer information projects and services	11	227,000
State Program Development Training of State officials	3	20,000
International Program Development Develop and maintain liaison programs with foreign countries exporting foods to the United States in order to achieve conformance with tolerances.	1	15,000

Current plans provide for expansion of the pesticide program activities at the rate of approximately 10 percent each year for the next 5 years.

Monitoring, Surveillance, and Compliance Programs

Department of Agriculture

1. Monitoring programs

The U.S. Department of Agriculture in 1964 initiated a program specifically designed to establish pesticide residue profiles in limited areas. These pilot studies, located in the Mississippi River Delta, included five areas in Mississippi and Arkansas. Representative farms were selected where records of the kinds and amounts of pesticides had been kept for 10 to 15 years. The program was designed to determine existing pesticide levels in soils, sediment, water, crops, livestock, and certain species of aquatic and land animals inhabiting the study areas. Adjustments in the program have permitted the establishment of similar areas near Yuma, Arizona, and Grand Forks, North Dakota.

In addition to these study areas, soil samples have been analyzed from 17 locations having high pesticide use histories; 13 locations where pesticides were used occasionally, such as forests and rangelands; and 13 locations on Forest Service lands and National Wildlife Areas where no pesticides were reported to have been used.

The Department's monitoring program operates in 19 States. A total of 48 different types of agricultural or environmentally related samples have been analyzed.

Analysis of agricultural soils after several yearly applications of chlorinated insecticides has shown no evidence of accumulation or buildup. Residues in nontreated food or feed crops can usually be associated with the residues found in the soil. In certain cases, illegal residues have been found in such crops as carrots, potatoes, soybeans, or peanuts grown in soil that had been previously treated with the more persistent chlorinated hydrocarbon pesticides.

The movement of pesticides into water is closely associated with the movement of soil particles. Repeated sediment analysis of major water bodies as well as farm ponds indicates a low level concentration of pesticides.

The monitoring program utilizes 36 man-years, 21 of which are professional scientists. Approximately $530,000 is allocated for the conduct of this program.

Over the next few years, the monitoring program of the Department will be continued to the point where the status of pesticide residues in the soils of every State will be determined. Periodic re-examination of the soils will provide a continuing assessment of pesticide residues in the soil.

2. Surveillance and compliance

The most accurate evaluation of the effectiveness of any regulatory program is accomplished by the systematic sampling and analysis of the products being regulated -- in this case, the pesticides available to the user and the food and feed commodities that have been treated with the pesticides.

The Department of Agriculture maintains a nationwide surveillance program on pesticides shipped in interstate commerce. A force of 31 inspectors, working out of Washington, D.C., and five field stations systematically inspect and sample pesticides in warehouses and in sales outlets. The pesticides are inspected for registration, adequacy of information on the label, and for other important aspects. The inspectors also sample representative pesticides and submit the samples for chemical analysis or biological activity. This enforcement program is supported by 95 field personnel. For fiscal year 1967, the budget of the enforcement program amounted to $2,200,000.

During fiscal year 1967, a total of 5,154 samples were taken. The Department instituted seizure actions in 189 cases. Where minor violations of the law were noted, the registrant was notified and corrective action was taken.

3. Surveillance of domestic and imported red meat

The Meat Inspection Act administered by the Department of Agriculture requires the surveillance of meat and meat products processed under Federal inspection, and the surveillance of imported meats to certify their wholesomeness. A significant portion of the program consists of objective samples where there is no reason to suspect excessive residues.

During 1965 and 1966, 5,036 objective samples were obtained from animals slaughtered in federally inspected establishments. About 71% of these samples contained residues of chlorinated organic pesticide chemicals. DDT and its metabolites, TDE and DDE, were found in about 66% of the samples. The next most frequently found pesticide chemicals were, in decreasing order of frequency, BHC, toxaphene, lindane, dieldrin and methoxychlor, with in incidence range of 2-4.5%. Heptachlor epoxide was found in 1.7% of the samples. Chlordane and endrin were reported in several samples. About 45% of the residues found were below 0.1 ppm on a fat basis and 66% were below 0.5 ppm.

Data obtained on 2,259 random samples of domestic red meat and 1,430 samples of imported red meat during the first 9 months of 1967 are tabulated in the Appendix, Table 25A and Figure 25A.

A comparison of the data obtained on domestic samples thus far in 1967 with that obtained in 1965-1966 indicates an increased incidence of DDT compounds primarily in the range T-0.10 ppm in 1967. The incidence of dieldrin, heptachlor epoxide, BHC and lindane shows an increase ranging 10-31% of samples examined. The incidence of methoxychlor and toxaphene has decreased to about 0.1% of samples examined. The distribution among the different quantitative levels of residues has not changed greatly.

Generally, the same kinds and levels of residues were found in imported red meats. Although the limited data does not provide a basis for a firm conclusion, it appears that dieldrin and BHC residues may be more common in imported meats, while heptachlor epoxide residues may be less common.

Except for DDT compounds on domestic and import samples and dieldrin and BHC on import samples, over 95% of the residues were below 0.1 ppm on a fat basis. Additional data will be required to evaluate the significance of these findings.

Food and Drug Administration

Residue Levels in Foods

1. Surveillance and Compliance Programs

The Food and Drug Administration surveillance and compliance programs were expanded substantially beginning with fiscal year 1963. FDA now collects and examines 25,000 samples annually in addition to inspecting the growing areas in order to determine the actual practices being followed. Quantitative multi-residue methods of analysis using gas-liquid chromatography at routine sensitivity levels of approximately 0.03 ppm on most crops were in common use beginning in FY 1964. These methods measure more than 60 common chlorinated organic and organo-phosphorus pesticide chemicals.

A majority of the samples collected in this program were categorized as "objective" samples. Objective samples are those collected where there is no suspicion of excessive residues or misuse of the pesticide chemical. Only the objective samples are used in this report and the findings are considered to be generally representative of the food supply.

In general, during the past four fiscal years about half of the samples contained residues of one or more pesticide chemicals. About 3% of the samples were found to exceed legal tolerances or, in absence of legal tolerances, administrative guides for excessive residues. Shipments, or lots, of food found to contain excessive residues are removed from food channels where possible. Follow-up procedures are used to prevent other portions of a lot found to contain excessive residues from reaching the consumer. Exportation of food containing excessive residues is not permitted unless it complies with the laws of the importing country. There are no substantial differences in the residues in foods produced in the United States and those imported from other countries.

Although approximately one-half of the samples contain residues, a majority of the residues are at very low levels. Over 75% of the individual pesticide residues found were below 0.11 ppm and 95% of the residues were below 0.51 ppm. This general pattern of residue levels is observed when the data is considered by specific pesticide chemical, food category, domestic and imported products, or on an annual basis. Therefore, the average level of residues within a food category is quite low and the percentage of lots containing residues in excess of 2 ppm of any residue is very low. Generally, foods sampled in the surveillance program undergo further processing or preparation prior to consumption.

Market basket samples are obtained from retail stores bimonthly in the 5 regions, prepared for consumption and examined for pesticide residues at sensitivity levels substantially lower than those used in the examination of surveillance samples. Much additional analytical time is required to attain these lower levels of sensitivity and to confirm the results. The proportion of individual food items used in the study was developed by the U.S. Department of Agriculture, Household Economics Research Division, for the high consumption level of a 16-19 year old male. Each sample represents a two-week supply of food. Food items are composited into 12 classes of similar foods for more reliable analysis and to minimize the dilution factor.

The results obtained during the past three years have shown that the amounts of pesticide chemicals in this high consumption diet, approximately twice that of the normal individual, are well below the acceptable daily intakes established by the FAO-WHO Committee, except for aldrin and dieldrin combined. The daily intake for these compounds calculated from the total diet samples has been approximately equivalent to the FAO-WHO acceptable daily intake for the past three years.

Table 1, attached, shows detailed information on WHO-FAO acceptable daily intakes compared with the daily intake calculated from these studies. Table 2 shows the average milligrams of the total chlorinated organic pesticides found in the 12 food classes in each of the three years. Table 3 shows the daily intake of 15 pesticide chemicals most frequently found and the incidence of positive composites for each of the three years. No significant changes are observed with respect to kinds or amounts of residues, with the possible exception of kelthane.

The frequency of occurrence and sensitivity of the method must be considered in attaching significance to the calculated daily intake. We are unwilling to conclude, for example, that the daily intake of carbaryl exceeds that of DDT. The method for carbaryl is relatively insensitive, 0.1-0.2 ppm, and relatively few positive findings serve to unduly influence the calculated value. Carbaryl was not identified as a common component of the dietary intake. It was included in Table 1 because an international acceptable daily intake was available for comparison and in recognition of the specific analysis of the total diet samples for carbaryl residues.

It is noteworthy that the combination of foods in meat, fish, poultry and dairy products account for over half of the intake of chlorinated organic pesticides. There are few registered uses of pesticide chemicals known to result in residues in meat and poultry. No

TABLE 1

DIETARY INTAKE OF PESTICIDE CHEMICALS

Compound	WHO-FAO Acceptable Daily Intake	Milligrams/Kilogram body weight/day Total Diet Studies 1965	1966	1967	Average 3 Years
Aldrin		0.00001	0.00004	0.00001	0.00002
Dieldrin		0.00008	0.00009	0.00005	0.00007
Total	0.0001	0.00009	0.00013	0.00006	0.00009
Carbaryl	0.02	0.0021	0.0005	0.0001	0.0009
DDT	0.01	0.0004	0.0005	0.0004	0.0004
DDE	-	0.0003	0.0003	0.0002	0.0003
TDE	-	0.0002	0.0002	0.0002	0.0002
Total		0.0009	0.0010	0.0008	0.0009
Dichlorvos	0.004		Not determined		
Diphenyl	0.125		Not determined		
Gamma BHC (lindane)	0.0125	0.00007	0.00006	0.00007	0.00007
Bromide	1.0	0.39*	0.22*	0.29*	0.30*
Heptachlor		0.000003		0.000001	0.000001
Heptachlor Epoxide		0.00003	0.00005	0.00002	0.00003
Total	0.0005	0.000033	0.00005	0.000021	0.000031
Malathion	0.02	-	0.0001	0.0002	0.0001
Diazinon	0.002	-	0.00002	-	0.000005
Dimethoate	0.004		Not determined		
Phosphoamidon	0.001		Not determined		
BHC	-	0.00003	0.00004	0.00003	0.00003
Kelthane	-	0.00004	0.00015	0.00018	0.00013
Endrin	-	0.000009	0.000004	0.000004	0.000006
All Chlorinated Organics		0.0012	0.0016	0.0012	0.0013
All Organo-phosphorus		-	0.00014	0.00025	0.00013
All Herbicides		0.00012	0.00022	0.00005	0.00013

* Total bromide present - includes naturally occurring bromides

TABLE 2

Chlorinated Pesticides in Ready-to-Eat Foods
Total Diet Samples - Food and Drug Administration

	Composite		average milligrams per day 1964-56	1965-66	1966-67
I.	Dairy Products	(Mg.)	0.010	0.018	0.014
		%	12.2	14.5	17.5
II.	Meat, Fish & Poultry	(Mg.)	0.032	0.058	0.028
		%	39.0	46.8	35.0
III.	Grains & Cereal	(Mg.)	0.008	0.009	0.006
		%	9.8	7.3	7.5
IV.	Potatoes	(Mg.)	0.002	0.003	0.001
		%	2.4	2.4	1.3
V.	Leafy Vegetables	(Mg.)	0.004	0.004	0.002
		%	4.9	3.2	2.5
VI.	Legume Vegetables	(Mg.)	0.003	0.001	T
		%	3.7	0.8	-
VII.	Root Vegetables	(Mg.)	0.002	0.001	T
		%	2.4	0.8	-
VIII.	Garden Fruits	(Mg.)	0.010	0.011	0.008
		%	12.2	8.9	10.0
IX.	Fruits	(Mg.)	0.007	0.015	0.018
		%	8.5	12.1	22.5
X.	Oils, Fats & Shortening	(Mg.)	0.003	0.004	0.002
		%	3.7	3.2	2.5
XI.	Sugars & Adjuncts	(Mg.)	0.001	T	T
		%	1.2	-	-
XII.	Beverages	(Mg.)	-	-	-
		%			

T = less than 0.001 mg

TABLE 3

AVERAGE INCIDENCE AND DAILY
INTAKE OF 15 PESTICIDE CHEMICALS

	1964-1965		1965-1966		1966-1967	
	% Positive Composites*	Daily Intake Mg.	% Positive Composites**	Daily Intake Mg.	% Positive Composites***	Daily Intake Mg.
DDT	37.5	0.031	37.3	0.041	38.6	0.026
DDE	31.5	0.018	33.0	0.028	31.1	0.017
TDE	19.4	0.013	25.7	0.018	28.9	0.013
Dieldrin	18.5	0.005	21.3	0.007	15.3	0.004
Lindane	15.8	0.004	12.3	0.004	10.6	0.005
Heptachlor Epoxide	13.4	0.002	12.0	0.003	8.9	0.001
BHC	6.5	0.002	6.0	0.004	8.9	0.002
Malathion	-	-	5.3	0.009	3.6	0.010
Carbaryl	7.4	0.15	2.7	0.026	1.1	0.007
Aldrin	5.6	0.001	3.7	0.002	3.3	0.001
2,4-D	4.2	0.005	3.0	0.002	1.7	0.001
Diazinon	-	-	3.0	0.001	0.3	T
Kelthane	0.5	0.003	3.7	0.002	5.6	0.012
PCP	1.4	T	3.3	0.006	2.2	0.001
Endrin	2.8	T	2.0	T	1.7	T

T=less than 0.001 ppm

* 216 composites examined
** 312 composites examined
*** 360 composites examined

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registrations have been granted which are calculated to result in residues in milk. Therefore, there are environmental factors contributing "unavoidable residues in these commodities.

The use of fungicides and anti-scald agents on fruit prior to shipment is a common, but not invariable, practice in the major fruit producing areas in the United States. The compounds most frequently encountered during surveillance inspections are sodium ortho-phenylphenate, copper carbonate, ethoxyquin, diphenylamine and diphenyl. These compounds are applied by various means to the fruit; for example, through washes, waxes, wrappers and on pads enclosed in the shipping container.

Inspectional observations have not revealed misuses or misapplications of these chemicals which might result in residues above tolerance levels.

Analyses are rarely made on the finished product, since these compounds are not detected in the multi-residue analytical procedure routinely employed in the surveillance program. Where analyses have been made, no residues in excess of established tolerances have been found and the levels found were substantially below tolerance levels.

Tables 4-14 summarize the data obtained from samples examined as shipped in interstate commerce and as imported into the United States during fiscal years 1964-1967. Comparative averages in ppm for specific chemicals are shown for the raw product and the portion of the total diet sample most closely related to the raw product in the following food categories:

Table 4 - Large Fruits
Table 5 - Small Fruits
Table 6 - Grains & Cereals (Human)
Table 7 - Leaf & Stem Vegetables
Table 8 - Vine and Ear Vegetables
Table 9 - Root Vegetables
Table 10 - Beans
Table 11 - Eggs
Table 12 - Nuts (except peanuts)
Table 13 - Processed Foods
Table 14 - Grains (animal)

Each table shows the number of samples examined, domestic and imported, the percent samples with residues, the percent with residues exceeding guidelines. The incidence and average level of the 10 most commonly found pesticide chemicals in all foods are listed for each class of

Table 4

PESTICIDE RESIDUES IN LARGE FRUITS

Fiscal Years 1964, 1965, 1966 and 1967
Raw Agricultural Products
(apples, oranges, pears, peaches, etc.)

	DOMESTIC	IMPORT
No. Samples Examined:	4,399	2,299
Percent with Residues:	55.6	53.9
Percent with Residues Above Tolerances or Guidelines:	0.4	5.9

June 1964 - April 1967
Total Died Samples - Ready-to-Eat Food
Fruit Composites
(oranges, orange juice, raisins peaches, strawberries, apricot cherries, pineapple, grapes, bananas, etc.)

74 Composites

Compounds	Incidence Percent	Average ppm	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	31.7	0.14	14.7	0.02	44.6	0.008
DDE	18.9	0.01	6.6	T	43.2	0.002
TDE	8.6	0.01	2.5	T	24.3	0.002
Lindane	1.7	T	3.1	T	8.1	T^1
Dieldrin	13.4	T	24.4	0.01	9.5	T^1
Aldrin	6.9	T	1.0	T	27.0	0.003
BHC	0.4	T	0.7	T	1.4	T^1
Endrin	1.4	T	32.5	0.01	1.4	T^1
Heptachlor Epoxide	0.7	T	0.7	T	-	
Toxaphene	0.3	T	0.1	T	-	
Thiodan	1.2	T	0.4	T	1.4	T^1
Carbaryl	*	0.01	*	-	9.5	0.015
Kelthane	8.6	0.02	3.3	0.01	41.9	0.031
Parathion	*	T	*	T	-	
Tedion	*	T	*	0.01	2.7	T^1
Ethion	*	0.01	*	T		
Diazinon	*	T	*	T		
Trithion	*	T	*	T		

T = less than 0.005 ppm
* Not included in analytical method 1964-1965
T^1 = less than 0.001 ppm

TABLE 5

PESTICIDE RESIDUES IN SMALL FRUITS (1)

Fiscal Years 1964, 1965, 1966 and 1967
Raw Agricultural Products
(strawberries, cherries, plums, grapes, cranberries, etc.)

	DOMESTIC	IMPORT
No. Samples Examined:	1,912	294
Percent with Residues:	55.0	42.5
Percent Residues Above Tolerance or Guidelines:	0.4	0

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	35.7	0.06	35.0	0.07
DDE	20.6	0.01	17.4	0.01
TDE	6.8	0.01	4.8	T
Lindane	1.3	T	1.4	T
Dieldrin	9.4	T	2.7	T
Aldrin	2.2	T	2.4	T
BHC	0.1	T	2.1	T
Endrin	0.5	T	1.4	T
Heptachlor Epoxide	1.0	T	0.7	T
Toxaphene	1.3	0.01	0.4	T
Kelthane	5.1	0.03	2.1	0.02
Perthane	2.7	0.06	-	-
Thiodan	1.4	T	2.1	T
Parathion	*	T	*	T
Ethion	*	T	*	-
Tedion	*	0.01	*	-

T = less than 0.005 ppm

* Not included in analytical method 1964-1965

(1) Small Fruits included in Fruit Composites of Total Diet Samples

TABLE 6

PESTICIDE RESIDUES IN GRAINS AND CEREALS FOR HUMAN USE

(1)

	Fiscal Years 1964, 1965, 1966 and 1967 Raw Agricultural Products (wheat, grain corn, rice, etc.)		June 1964 - April 1967 Total Diet Samples - Ready-to-Eat Food - Grain & Cereal Composites (flour, bread, corn meal, vegetable corn, rice, macaroni pie crust, etc.)	
	DOMESTIC	IMPORT		
No. Samples Examined:	6,513	92		
Percent with Residues:	31.6	18.5		
Percent Residues Above Tolerances or Guidelines:	1.1	2.2	74	Composites

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	20.7	0.03	12.0	0.01	52.7	0.005
DDE	9.6	T	1.1	T	24.3	T^1
TDE	2.6	T	-		16.2	T^1
Lindane	8.6	T	9.8	T	75.4	0.008
Dieldrin	3.6	T	1.1	T	28.4	0.002
Aldrin	2.2	T	3.3	T	5.4	T^1
BHC	1.5	T	1.1	T	2.7	T^1
Endrin	0.2	T	1.1	T	2.7	T^1
Heptachlor Epoxide	0.2	T	-		4.1	T^1
Toxaphene	0.3	T	-		-	
Malathion	*	0.55	*	-	25.7	0.012
Carbaryl	*	T	*	-	5.4	0.017
PCP	-		-		5.4	0.009
Methoxychlor	2.4	0.01	-			
Chlordane	0.7	T	3.3	T		
Heptachlor	0.3		3.3			
Diazinon	*	T	*	-		
Parathion	*	T	*	-		

T = less than 0.005 ppm
* Not included in analytical method 1964-1965
(1) Includes human and animal grains 1964-1965
T^1 = less than 0.001 ppm

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TABLE 7

PESTICIDE RESIDUES IN LEAF AND STEM VEGETABLES

Fiscal Years 1964, 1965, 1966 and 1967
Raw Agricultural Products
(spinach, mustard, celery, broccoli, cabbage, kale, etc.)

	DOMESTIC	IMPORT
No. Samples Examined:	9,789	122
Percent with Residues:	59.0	48.4
Percent Residues Above Tolerances or Guidelines:	3.4	3.3

June 1964 - April 1967
Ready-to-Eat Foods - Leafy Vegetables
(beet tops, collards, mustard, spinach, celery, cabbage, broccoli, mushrooms, cauliflower)

74 Composites

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	36.0	0.14	25.4	0.06	54.1	0.013
DDE	24.4	0.01	10.7	0.01	39.2	0.004
TDE	7.6	0.01	0.8	T	33.8	0.008
Lindane	3.7	0.01	4.9	T	10.8	T[1]
Dieldrin	10.1	T	13.1	0.01	6.8	T[1]
Aldrin	2.4	T	4.1	T	1.4	T[1]
BHC	1.3	T	0.8	T	6.8	T[1]
Endrin	4.6	T	2.5	T	2.7	T[1]
Heptachlor Epoxide	3.0	T	3.3	0.01	1.4	T[1]
Toxaphene	6.4	0.18	0.8	T	1.4	0.005
Parathion	*	0.03	*	-		
Thiodan	2.9	0.01	3.3	T		
PCNB	0.9	0.01	0.8	T		
Methoxychlor	0.2	T	2.5	0.01		
Mitox	0.02	T	1.6	T		
Diazinon	*	0.01	*	T		
Metacide	*	0.01	*	-		
Dacthal	0.6	T	-			

T = less than 0.005 ppm
* Not included in analytical method 1964-1965
T[1] = less than 0.001 ppm

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TABLE 8

PESTICIDE RESIDUES IN VINE AND EAR VEGETABLES

Fiscal Years 1964, 1965, 1966 and 1967 Raw Agricultural Products (tomatoes, corn, squash, eggplant, etc.)	DOMESTIC	IMPORT	June 1964 - April 1967 Total Diet Samples - Ready-to-Est Foods - Garden Fruits - Composites (pepper (raw), tomatoes, cstsup, cucumbers, eggplant, squash)
No. Samples Examined:	6,163	1,187	74 Composites
Percent with Residues:	42.1	72.5	
Percent Residues Above Tolerances or Guidelines:	1.5	0.8	-

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	18.3	0.03	51.0	0.09	66.2	0.031
DDE	8.5	T	27.0	0.01	39.2	0.004
TDE	5.6	0.01	3.0	T	50.0	0.013
Lindane	2.4	T	5.0	T	33.8	0.002
Dieldrin	18.5	0.01	20.7	0.01	29.7	0.002
Aldrin	1.2	T	1.2	T	4.1	T^1
BHC	0.6	T	1.1	T	1.4	T^1
Endrin	3.2	T	9.5	T	2.7	T^1
Heptachlor Epoxide	2.4	T	2.3	T	5.4	T^1
Toxaphene	1.4	0.01	2.0	0.02	2.7	T^1
Chlordane	2.0	T	0.3	T	2.7	T^1
Thiodan	1.2	T	3.3	T	4.1	T^1
Parathion	*	T	*	T	2.7	0.001
Diazinon	*	T	*	-		

T = less than 0.005 ppm
* Not included in analytical method 1964-1965
T^1 = less than 0.001 ppm

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TABLE 9

PESTICIDE RESIDUES IN ROOT VEGETABLES

Fiscal Years 1964, 1965, 1966 and 1967
Raw Agricultural Products
(carrots, beets, potatoes, onions, turnips, etc.)

June 1964 - April 1967
Total Diet Samples - Ready-to-Eat Foods
Root Vegetables and Potatoes
(carrots, onions, beets, turnips, etc., white potatoes, sweet potatoes, potato chips, etc.)

	DOMESTIC	IMPORT	
No. Samples Examined:	10,558	367	74 Composites
Percent with Residues:	49.5	53.4	
Percent Residues Above Tolerances or Guidelines:	2.6	0.8	

Specific Chemicals	Domestic Incidence Percent	Domestic Average ppm	Import Incidence Percent	Import Average ppm	Root Vegetables Incidence Percent	Root Vegetables Average ppm	Potatoes Incidence Percent	Potatoes Average ppm
DDT	33.5	0.04	24.0	0.04	18.9	0.003	20.3	0.001
DDE	30.2	0.02	7.1	T	29.7	0.003	24.3	T^1
TDE	8.5	T	1.6	T	12.2	0.002	8.1	T^1
Lindane	2.3	T	2.7	T	-		9.5	T^1
Dieldrin	25.8	0.01	17.7	0.01	13.5	0.001	16.2	T^1
Aldrin	2.9	T	10.1	T	-		-	
BHC	0.8	T	10.1	0.02	-		1.4	T^1
Endrin	5.2	T	0.3	T	4.1	T	13.5	T^1
Heptachlor Epoxide	3.8	T	5.7	T	-		5.4	T^1
Toxaphene	1.1	T	-	T	-		-	
Chlordane	1.9	T	0.3					
Heptachlor	0.8	T	4.6	T				
Diazinon	*	T	*	0.01				
Parathion	*	T	*	-				
Metacide	*	T	*	T				

T = less than 0.005 ppm
* Not included in analytical method 1964-1965
T^1 = less than 0.001 ppm

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TABLE 10

PESTICIDE RESIDUES IN BEANS

Fiscal Years 1964, 1965, 1966 and 1967 Raw Agricultural Products (peas, green beans, lima beans, etc.)	DOMESTIC	IMPORT
No. Samples Examined:	1,307	86
Percent with Residues:	31.5	77.9
Percent with Residues Above Tolerances or Guidelines:	0.4	0

June 1964 - April 1967
Total Diet Samples
Ready-to-Eat Foods
Legume Vegetables
(peas, green beans, lima beans)

74 Composites

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	22.0	0.09	60.5	0.13	16.2	0.007
DDE	9.5	T	46.5	0.01	17.6	T^1
TDE	2.3	T	3.5	T	17.6	0.003
Lindane	1.1	T	10.5	T	2.7	T^1
Dieldrin	6.7	T	10.5	T	2.7	T^1
Aldrin	0.5	T	2.3	T	2.7	T^1
BHC	0.7	T	4.7	T	-	
Endrin	0.3	T	1.2	T	-	
Heptachlor Epoxide	0.4	T	1.2	T	1.4	T
Toxaphene	0.9	T	1.2	T	-	
Parathion	*	T	*	0.01		
Diazinon	*	T	*	-		

T = less than 0.005 ppm
* Not included in analytical method 1964-1965
T^1 = less than 0.001 ppm

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TABLE 11

PESTICIDE RESIDUES IN EGGS(1)

Fiscal Years 1964, 1965, 1966 and 1967
Raw Agricultural Products
(shell eggs)

	DOMESTIC	IMPORT
No. Samples Examined:	2,444	116
Percent with Residues:	72.2	52.6
Percent with Residues Above Tolerances or Guidelines	5.9	14.7

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	44.5	0.04	14.7	0.01
DDE	66.4	0.04	26.7	0.01
TDE	8.2	T	0.9	T
Lindane	6.1	T	9.5	T
Dieldrin	21.6	0.01	6.0	T
Aldrin	0.6	T	-	-
BHC	2.6	T	0.9	T
Endrin	1.1	T	-	-
Heptachlor Epoxide	3.1	T	3.4	T
Toxaphene	0.2	T	-	-

T = less than 0.005 ppm

(1) Eggs included in Meat, Fish and Poultry composites of Total Diet Samples

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TABLE 12

PESTICIDE RESIDUES IN NUTS

Fiscal Years 1964, 1965, 1966 and 1967
Raw Agricultural Products
(pecans, filberts, walnuts, etc.)

	DOMESTIC	IMPORT
No. Samples Examined:	373	122
Percent with Residues:	21.7	49.2
Percent Residues Above Tolerances or Guidelines:	0.8	0.8

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	11.5	0.03	21.3	0.02
DDE	8.8	0.01	23.0	0.05
TDE	4.0	T	12.3	0.01
Lindane	1.6	T	8.2	0.01
Dieldrin	4.3	0.06	8.2	T
Aldrin	1.1	T	0.8	T
BHC	1.6	T	22.1	0.05
Endrin	0.8	T	-	
Heptachlor Epoxide	0.5	T	-	
Toxaphene	0.3	T	1.6	T

T = less than 0.005 ppm

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TABLE 13

PESTICIDE RESIDUES IN PROCESSED FOODS

Fiscal Years 1964, 1965, 1966 and 1967
Products: Canned and/or frozen products such as peaches, beans, carrots, apricots, celery powder, etc.

	DOMESTIC	IMPORT
No. Samples Examined:	606	578
Percent with Residues:	49.3	34.8
Percent with Residues Above Tolerances or Guidelines:	13.9	0.7

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	20.0	0.12	15.1	0.03
DDE	17.5	0.33	8.7	T
TDE	9.9	0.15	5.4	0.01
Lindane	15.2	0.04	2.9	0.01
Dieldrin	6.9	0.02	7.3	0.01
Aldrin	2.5	T	1.2	T
BHC	0.7	T	3.8	T
Endrin	3.3	T	6.2	T
Heptachlor Epoxide	0.8	T	0.7	T
Toxaphene	5.0	0.45	0.2	T
Diazinon	*	0.28	-	-
Carbaryl	*	0.03	-	-
Malathion	*	0.01	*	T
Kelthane	1.3	0.01	-	-
Parathion	*	0.20	*	T
Metacide or Methyl Parathion	*	0.14	*	-
Thiodan	*	T	*	T

T = less than 0.005 ppm
* Not included in analytical method 1964-1965

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TABLE 14

PESTICIDE RESIDUES IN GRAINS (ANIMAL)

Fiscal Years 1966 and 1967
Raw Agricultural Products
(wheat, grain corn, milo, etc.)

	DOMESTIC	IMPORT
No. Samples Examined:	710	45
Percent with Residues:	36.9	24.5
Percent with Residues Above Tolerances or Guidelines:	1.3	0

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	20.4	0.02	13.3	T
DDE	10.0	T	-	
TDE	5.2	T	-	
Lindane	3.5	T	8.9	T
Dieldrin	6.1	T	-	
Aldrin	1.7	T	2.2	T
BHC	1.7	T	-	
Endrin	0.4	T	-	
Heptachlor Epoxide	2.5	T	-	
Toxaphene	0.1	T	-	
Malathion	*	0.06	-	

T = less than 0.005 ppm
* Not included in analytical method 1964-1965

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foods. In addition, the tables list the incidence and average of all chemicals found in more than 1% of samples in the food category. The incidence level is not shown for the organophosphorus compounds because all samples were not examined for this class of compounds until 1966. The incidence level is not shown for carbaryl because not all samples were examined for carbaryl residues.

The data from which the summary tables were prepared are given in detail in tables and graphs in the Appendix. These tables show the distribution of each residue within arbitrarily selected ranges of levels by year for domestic and imported samples. The graphs show the cumulative total, in percent, of various levels of residues in domestic and import samples.

Generally, the same kinds of pesticide residues were found in domestic and imported products. Where the positive findings for a chemical were significant, 5% or more of the samples, the levels were about the same. More than half of the samples examined contain residues and about one-third of the samples contain more than one residue.

Generally, the same kinds of pesticide chemicals are found in the foods after preparation for consumption, but there are substantial reductions in the levels. For example, the average levels for DDT found in ready-to-eat foods are about one-tenth the average in the raw product.

There have been no significant trends or changes in the incidence or levels of residues of chlorinated organic pesticide chemicals observed in the surveillance and compliance programs in either domestic or imported foods during the past 4 years. This observation is confirmed by the market basket samples used in the total diet studies on food ready for consumption.

An improved analytical procedure for organophosphorus pesticide was used beginning with the 1966 surveillance programs. In some cases the data reported in the various tables may reflect what appears to be a significant increase in the residues of organophosphorus chemicals. Although there may be some increase in the use of organophosphorus pesticides, we ascribe the higher incidence of these residues to the improved analytical procedures.

Pesticide residues found in vegetable oil seeds and their products during 1964-1966 are summarized by commodity and product in Tables 15-21. More detailed data for these commodities is not presented. Data for fiscal year 1967 was not developed because of the rather limited number of samples. However, no significant changes were observed in

TABLE 15

Vegetable Oil
Seeds and Products
Distribution of Residues by Products
in Different Quantitative Ranges
Fiscal Years 1964, 1965, 1966

Percent of Positive Samples

Level ppm	Seed %	Meal %	Crude Oil %	Refined Oil %	Oleomargarine %
T-0.03	65.2	71.4	43.0	33.3	68.4
0.04-0.10	17.8	15.1	17.7	23.1	10.5
0.11-0.50	15.8	10.1	28.5	23.1	21.1
0.51-1.00	1.0	2.1	6.6	7.7	
1.01-1.50	0.2	0.8	2.4	12.8	
1.51-2.00		0.4	0.5		
2.00			1.3		

T = less than 0.001 ppm

TABLE 16

Average Level and Incidence of Specific Pesticide Residues in Soybean Products Fiscal Years 1964-1965-1966

	Soybeans		Crude Oil		Meal (Cake)		Refined Oil	
No. Samples	550		98		143		23	
% w/Residues	26.7		34.7		14.0		17.4	
	Percent Samples	Average ppm	Percent Samples	Average ppm	Percent Samples	Average ppm	Percent Samples	Average ppm
DDT	9.6	0.006	16.3	0.015	7.0	0.005	13.0	0.003
TDE	0.7	T	7.1	0.006	1.4	T	-	-
DDE	2.7	T	6.1	0.002	3.5	0.001	-	-
Dieldrin	8.0	0.002	17.3	0.013	1.4	T	4.3	T
Lindane	2.2	T	2.0	T	4.9	0.001	-	-
Toxaphene	8.0	0.004	4.1	0.024		-	4.3	T
Endrin	9.8	0.008	6.1	0.013	0.7	T	-	-
BHC	2.9	T	11.2	0.004	0.7	T	-	-
Chlordane	0.9	T	-	-	0.7	T	-	-
Fiscal Year 1967								
No. Samples	89		17		55		10	
% w/Residues	61.8		64.7		20.0		10.0	

No significant changes in specific chemicals and levels from those tabulated above.

T = less than 0.001 ppm

TABLE 17

Average Level and Incidence of Specific
Pesticide Residues in Cottonseed Products
Fiscal Years 1964-1965-1966

	Seed		Crude Oil		Meal (Cake)		Refined Oil	
No. Samples	23		226		186		41	
% w/Residues	78.3		53.5		39.8		41.5	
	Percent Samples	Average ppm	Percent Samples	Average ppm	Percent Samples	Average ppm	Percent Samples	Average ppm
DDT	69.5	0.154	29.2	0.077	28.5	0.028	12.2	0.024
TDE	13.0	0.029	35.4	0.093	12.9	0.003	17.1	0.016
DDE	13.0	0.005	15.0	0.012	16.1	0.005	12.2	0.010
Dieldrin	4.3	0.015	2.7	T	1.6	T	2.4	T
Lindane	4.3	0.003	8.4	0.008	8.6	0.003	2.4	0.018
Toxaphene	30.4	0.023	1.3	0.010	1.1	0.003	12.2	0.140
BHC	8.7	0.017	2.7	0.004	4.8	0.008	-	-
Chlordane	8.7	0.004	2.2	0.017	6.5	0.012	2.4	0.007

Fiscal Year 1967				
No. Samples	4	36	62	5
% w/Residues	25.0	52.8	35.5	60.0

No significant changes in specific chemicals
and levels from those tabulated above.

T = less than 0.001 ppm

TABLE 18

Average Level and Incidence of Specific
Pesticide Residues in Peanut Products
Fiscal Years 1964-1965-1966

	Nuts		Crude Oil		Meal (Cake)		Refined Oil	
No. Samples	177		36		31		10	
% w/Residues	26.6		75.0		61.3		33.3	
	Percent Samples	Average ppm	Percent Samples	Average ppm	Percent Samples	Average ppm	Percent Samples	Average ppm
DDT	13.5	0.025	66.7	0.466	45.2	0.140	20	0.060
TDE	1.7	T	41.7	0.128	22.6	0.026	20	0.007
DDE	9.6	0.001	58.3	0.090	38.7	0.025	20	0.032
Dieldrin	8.5	0.008	22.2	0.017	22.6	0.006	20	0.007
Lindane	2.8	0.002	5.6	0.001	3.2	T	-	-
Toxaphene	1.7	0.006	2.8	0.008	-	-	-	-
Endrin	1.1	T	2.8	0.008	-	-	-	-
BHC	3.4	0.007	8.3	0.002	12.9	0.006	10	0.002
Fiscal Year 1967								
No. Samples	29		4		6		1	
% w/Residues	58.6		75.0		50.0		100	

No significant changes in specific chemicals
and levels from those tabulated above.

T = less than 0.001 ppm

TABLE 19

Average Level and Incidence of Specific Pesticide Residues in Corn Products

Percent of Samples

	Grain		Crude Oil		Refined Oil	
No. Samples	819		27		8	
% w/Residues	13.4		25.9		25.0	
	Percent Samples	Average ppm	Percent Samples	Average ppm	Percent Samples	Average ppm
DDT	5.7	0.007	14.8	0.067	12.5	0.038
TDE	1.2	0.003	11.1	0.060	12.5	0.002
DDE	2.9	T	11.1	0.016	-	-
Dieldrin	4.4	0.001	11.1	0.013	-	-
Lindane	2.6	T	-	-	-	-
Toxaphene	-	-	-	-	-	-
Endrin	0.1	T	-			
Chlordane	-		3.7	0.080		
Fiscal Year 1967						
No. Samples	213		1		2	
% w/Residues	45.5		0		0	

No significant changes in specific chemicals and levels from those tabulated above.

T = less than 0.001 ppm

TABLE 20
Average Levels of Chlorinated Pesticide Residues
in Vegetable Oil Seeds and Products
Fiscal Years 1964-1965-1966
Parts per Million

	Product	Crude Oil	Meal or Cake	Refined Oil	Oleo-Margarine	Total Diet* Composites
			DDT			
Soybean	0.006	0.015	0.005	0.003		
Cottonseed	0.154	0.077	0.028	0.024		
Peanut	0.025	0.466	0.140	0.060		
Corn	0.007	0.067		0.038		
TOTAL	0.015	0.097	0.023	0.022	0.026	0.006
			TDE			
Soybean	T	0.006	T	-		
Cottonseed	0.029	0.093	0.003	0.016		
Peanut	T	0.128	0.026	0.007		
Corn	0.003	0.060		0.002		
TOTAL	0.001	0.072	0.005	0.010	0.002	0.008
			DDE			
Soybean	T	0.002	0.001	-		
Cottonseed	0.005	0.012	0.005	0.010		
Peanut	0.001	0.090	0.025	0.032		
Corn	T	0.016		-		
TOTAL	0.003	0.016	0.005	0.010	0.001	0.004
			DIELDRIN			
Soybean	0.002	0.013	T	T		
Cottonseed	0.015	T	T	T		
Peanut	0.008	0.017	0.006	0.007		
Corn	0.001	0.013		-		
TOTAL	0.004	0.006	T	T	-	0.001
			LINDANE			
Soybean	T	T	0.001	-		
Cottonseed	0.003	0.008	0.003	0.018		
Peanut	0.002	0.001	T	-		
Corn	T	-		-		
TOTAL	T	0.005	0.003	0.01	-	T
			TOXAPHENE			
Soybean	0.004	0.024	-	T		
Cottonseed	0.023	0.010	0.003	0.140		
Peanut	0.006	0.008	-	-		
Corn	-	-		-		
TOTAL	0.017	0.015	0.002	0.078	-	-
			ENDRIN			
Soybean	0.008	0.013	T			
Cottonseed	-	-	-	-		
Peanut	T	0.008	-	-		
Corn	T	-		-		
TOTAL	0.006	0.004	T	-	-	T
			BHC			
Soybean	T	0.004	T	-		
Cottonseed	0.017	0.004	0.008	-		
Peanut	0.007	0.002	0.006	0.002		
Corn	-	-	-	-		
TOTAL	0.003	0.003	0.004	T	T	0.001
			CHLORDANE			
Soybean	T	-	T	-		
Cottonseed	0.004	0.017	0.012	0.007		
Peanut	-	-	-	-		
Corn	-	0.080		-		
TOTAL	T	0.017	0.006	0.004	-	-

*Salad dressings, salad oil, mayonnaise, shortening & peanut butter. 74 composites 6/64-4/67

T = less than 0.001 ppm

TABLE 21

Incidence of Specific Residues
in Oleomargarine

(1) Average of findings Fiscal Years 1964, 1965 and 1966
(2) Average of findings Fiscal Year 1967

	(1)		(2)	
No. Samples	53		23	
% w/Residues	18.9		17.4	
	Samples Percent	Average ppm	Samples Percent	Average ppm
DDT	18.9	0.026	13.0	0.014
TDE	5.7	0.002	13.0	0.014
DDE	7.5	0.001	8.7	0.034
BHC	3.8	T	4.3	T
Dieldrin	-		4.3	T

T = less than 0.001 ppm

the relative incidence, kinds or levels of pesticide chemicals in the commodities or products for the entire period. No samples were found exceeding tolerances, except for dieldrin in soybeans, where the tolerance is zero. Although the average levels of residues in vegetable oil seeds and their products are very low, a majority of the residues are not sanctioned by tolerances. Most of the chlorinated organic chemicals are found in the oil fraction and are mostly removed in the refining process as is shown in the results on surveillance samples of refined oils and oleomargarine and confirmed in the oils, fats and shortening components of the total diet samples. There are potential problems of residues in oil seed meals even at low levels when used as animal feed.

Dairy products have been mentioned as contributing substantially, 13.6%, to the total dietary intake of chlorinated organic chemicals. Tables 22-24 summarize the findings of residues in dairy products, domestic and imported, for fiscal years 1964-1967 inclusive. The data from which these tables were prepared are given in detail in the Appendix.

This representative annual sampling of milk and dairy products marketed in the U.S. during this period shows that DDE, dieldrin, DDT, heptachlor epoxide, TDE, BHC, lindane, aldrin, heptachlor and methoxychlor account for 99% of the chlorinated organic residues found. More than 20 other chemicals were found in one or more of the 16,478 samples of domestic and imported dairy products examined. A substantial majority, 95%,of the samples were below 0.5 ppm on a fat basis and 71.5% were below 0.11 ppm.

Table 24 shows that the average levels and kinds of pesticide chemicals found in the objective samples are in good agreement with the findings on the dairy portion of the total diet samples collected at a different point in the distribution chain.

There are no known approved uses of pesticide chemicals which are calculated to result in residues in milk above the legal tolerance level. Their presence in milk fat results from indirect sources and misuse. Steps have been taken to minimize the indirect sources by reducing the approved uses and use patterns of some of the more persistent chlorinated organic pesticides. The lower average levels of dieldrin and heptachlor epoxide in 1967 may reflect this reduction if confirmed in 1968.

TABLE 22

PESTICIDE RESIDUES IN FLUID MILK
(Fat Basis)

Fiscal Years 1964, 1965, 1966 and 1967

	DOMESTIC
No. Samples Examined:	10,807
Percent with Residues:	58.6
Percent with Residues Above Guidelines	4.8

Specific Chemicals	Incidence Percent	Average ppm
DDT	24.5	0.04
DDE	42.9	0.07
TDE	16.0	0.02
Lindane	4.4	T
Dieldrin	28.8	0.04
Aldrin	2.2	T
Heptachlor Epoxide	23.0	0.03
BHC	9.3	0.01
Heptachlor	0.8	T
Methoxychlor	0.9	T

T = less than 0.005 ppm

TABLE 23

PESTICIDE RESIDUES IN DAIRY PRODUCTS
(Fat Basis)

Fiscal Years 1964, 1965, 1966 and 1967
Manufactured Dairy Products
(butter, cheese, ice cream, etc.)

	DOMESTIC	IMPORT
No. Samples Examined:	4,489	1,182
Percent with Residues:	57.2	58.2
Percent with Residues Above Guidelines or Tolerances:	2.1	3.7

Specific Chemicals	Incidence Percent	Average ppm	Incidence Percent	Average ppm
DDT	25.6	0.04	24.6	0.09
DDE	43.6	0.06	33.5	0.07
TDE	19.8	0.02	16.2	0.06
Lindane	6.4	T	6.3	0.01
Dieldrin	25.0	0.03	14.6	0.01
Aldrin	1.4	T	3.2	T
Heptachlor Epoxide	21.3	0.02	3.0	T
BHC	12.9	0.02	26.6	0.14
Heptachlor	0.8	T	0.1	T
Methoxychlor	0.4	T	-	

T = less than 0.005 ppm

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TABLE 24

Average Levels of Pesticide Chemicals in Dairy Products
Parts per Million (fat basis)

(1) Average findings for Fiscal Years 1964, 1965 and 1966
(2) Average findings for Fiscal Year 1967
(3) Total Diet Samples June 1964 - April 1966
(4) Total Diet Samples June 1966 - April 1967

	Objective Samples		Total Diet Samples	
	(1)	(2)	(3)	(4)
DDE	0.066	0.087	0.074	0.050
Dieldrin	0.042	0.017	0.017	0.019
DDT	0.042	0.033	0.037	0.032
Heptachlor Epoxide	0.036	0.005	0.010	0.006
TDE	0.026	0.017	0.013	0.022
BHC	0.007	0.055	0.008	0.011
Lindane	0.004	0.006	0.005	0.003
Aldrin	0.001	0.001	0.001	0.001
Heptachlor	0.002	T	-	0.001
Methoxychlor	0.001	0.001	0.002	0.005

T = less than 0.001 ppm

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This data shows that the average level of individual pesticide chemicals found in the various food categories is substantially below the quantities sanctioned by U.S. tolerances and administrative guidelines. The combined residue load of all pesticide chemicals found in the various food categories is far below sanctioned limits when calculated by proportionate parts of individual pesticides within similar chemical classes.

Inspection of the tables and charts in the Appendix show relatively uniform patterns of residue among the various quantitative ranges of residue levels, pesticide chemicals, food categories and years. There is a difference in order of magnitude in the incidence of residues above 0.5 ppm, even in those products and chemicals where the tolerance is much higher. Additional study is required to determine the full significance of this information. There are relatively few instances where the kinds and amounts of pesticide chemicals found on domestic foods differ from those found on imported foods and in such cases only one or two pesticide chemicals are involved.

In rather general terms, the data supports the following conclusions:

(a) Small amounts of chlorinated organic and organophosphorus pesticide chemicals are commonly present in foods as shipped in interstate and international commerce. Even smaller amounts of these chemicals are found in food when ready to eat. Herbicides and carbamate type pesticides are found infrequently in the total diet samples and cannot be recognized as a common component of the dietary intake of pesticide chemicals.

(b) The current dietary intake of pesticide chemicals in the United States is below safe levels established by U.S. and international authorities.

(c) The current legally sanctioned tolerances are substantially higher than the average amounts actually found in foods and for a vast majority of the individual lots where residues are actually present. The proportion of food containing residues at or above the tolerance level is exceedingly small.

(d) Many unsanctioned residues are found on foods, more as a result of environmental factors than from misuse. The lack of a legal sanction, or approval, for residues in or on

food does not insure that foods will remain free of such residues. Some of these are being found through the use of improved and more sensitive analytical procedures. Improved methods are employed in the programs as soon as they are available.

(e) The tolerance and control system employed by the U.S. has been successful in maintaining a food supply within established and safe limits of pesticide chemicals needed in the production of food and fiber.

Education, Information, and Coordination

The results of the registration, research, monitoring, surveillance, and compliance programs concerned with pesticides and pesticide residues are of limited value unless some mechanism is established to carry this information to other scientists, to those who advise on the use of pesticides, to those who use the pesticides, and to those who consume the commodities protected by pesticides.

The U.S. Department of Agriculture conducts a continuing nationwide information and education program on pesticide safety and pest control. The audience for this program is both the general consuming public and specific interest groups including housewives and gardeners, farmers and ranchers, commercial applicators and food processors, dealers and manufacturers.

The Department makes use of a wide variety of communications techniques and media to disseminate information. These include television and radio spot announcements and features, newspaper and magazine articles, safety cartoons, teaching aids for the schools, publications both for the lay public and the scientist, motion pictures and exhibits, and other channels. Regional and local schools and training courses are conducted for pesticide applicators, pest control operators, dealers, and other specialized groups.

Pesticide registrations are published in the USDA Summary of Registered Agricultural Pesticide Chemical Uses. As new registrations are granted, the appropriate information is published in loose leaf form and sent to all holders of the USDA Summary. At periodic intervals, the Summary is updated to incorporate the registrations granted since the last publication date. Approximately 6,000 copies of the Summary are distributed nationally and internationally.

A Pesticide Coordinator has been established within the Extension Service in each of the 50 States. The Pesticide Coordinator serves as a focal point for the receipt and dissemination of information on pesticides, pesticide usage, established tolerances, safe and proper usage, storage and handling of pesticide chemicals. The Coordinator also develops and maintains liaison with appropriate State agencies, such as State Departments of Agriculture, Public Health, Fish and Game, Resources and Conservation, Forestry, Recreation and other groups, organizations or associations having an interest in the safe and effective use of pesticides.

The Food and Drug Administration conducts a consumer information service thereby providing current information on the status of pesticides.

Each of the 17 Field Districts provides a Consumer Consultant who works closely with the various consumer groups such as Women's Clubs, Parent-Teachers Organizations, and similar groups. The Consumer Consultant indicates the need for the safe use and storage of pesticides, the need for reading and following the directions on the label, and provides printed informational material for distribution to the consumer groups. In these activities, the Consumer Consultants work very closely with the members of the State Extension Services.

The entire area of pesticides is coordinated under the activities of the Federal Committee of Pest Control. This Committee is composed of representatives of the Departments of Agriculture; Defense; Health, Education and Welfare; and Interior. There are four subcommittees within the Federal Committee on Pest Control. The membership of the subcommittees is drawn from the four Departments. The subcommittees and their functions are:

1. Research Subcommittee. Evaluates all federally financed pest control research to determine completeness of programs, duplication of effort and makes recommendations to the parent committee for its consideration.

2. Monitoring Subcommittee. Evaluates and coordinates all federally financed programs in monitoring the presence and effect of pesticides in the environment. The Pesticide Monitoring Journal is published under the direction of this committee.

3. Information Subcommittee. Coordinates the pesticide informational activities of the four Departments.

4. Program Review Subcommittee. All federally financed pesticide programs must be reviewed by the Federal Committee on Pest Control. The Program Review Subcommittee reviews these programs from the standpoint of safety to the applicators and the general public; safety to nontarget organisms, such as fish and wildlife; need for controlling the pest; and suitability of suggested pest control materials and methods.

The effectiveness of the Federal Committee on Pest Control can perhaps best be illustrated by the fact that, while it has no statutory authority over the various Departments of the Government, the recommendations of this Committee have been followed in all cases during the three years of the Committee's existence.

CONCLUSIONS

Results of residue analyses demonstrate that the U.S. system for establishing tolerances and enforcing pesticide regulations has been effective; the food that American farmers produce is good, safe, and nutritious.

Actual pesticide residues found on U.S.-produced foods are as low, in the main, as the lowest of the several national tolerances of other nations. Commodities imported into the United States generally contain the same levels of chemicals as do domestically produced products.

Total diet studies over a 4-year period reveal that ingestion of pesticide residues is lower than amounts judged to be safe by a joint committee on pesticides of the Food and Agricultural Organization of the United Nations and the World Health Organization, and by the U.S. Food and Drug Administration.

The formulation and successful enforcement of pesticide regulations in the United States is the product of close cooperation between the industry, the Department of Agriculture, the Food and Drug Administration of the Department of Health, Education, and Welfare, the State departments of agriculture, the Cooperative Extension Services, the land-grant universities and colleges, and an informed public.

SUMMARY

The United States is committed by law, policy, and the traditions of many decades to assure that the food supply of the Nation is safe, clean, and wholesome. The United States is committed to full enforcement of these laws, and accordingly, has developed criteria and protocols that are effective, workable, and enforceable. Within this primary goal, the United States seeks means that will permit its achievement with minimal dislocation of production or trade.

The statutory authority for the regulation of pesticides and pesticide residues entering interstate commerce has been established by the Congress of the United States. Under these statutes, the responsibility for registration of pesticides and pest control materials has been delegated to the U.S. Department of Agriculture. The establishment of tolerances for pesticides in or on human food and animal feeds has been delegated to the Food and Drug Administration of the Department of Health, Education, and Welfare. The basic laws are the Federal Insecticide, Fungicide and Rodenticide Act; the Food, Drug, and Cosmetic Act; and the meat and poultry inspection acts.

To obtain registration, a distributor must submit copies of his proposed labeling with adequate research data to support all of the claims made for the product to the Department of Agriculture. The data and the proposed label are carefully reviewed by specialists in pharmacology, chemistry, entomology, agronomy, plant and animal biology and bacteriology. The data must establish that the material, when used as directed,

1. will not result in hazard to the user or to the consumer of the treated commodities,

2. will not cause injury to crops or objects to which it is applied or to beneficial animals which are exposed,

3. will provide the pest control that is claimed on the label.

If all the specialists are convinced that the product can be used effectively and safely, and will not leave illegal residues on food or feed when all label warnings and directions are followed, it is accepted for registration and is registered.

When a petitioner or other interested party applies for registration of a product under the Federal Insecticide, Fungicide, and Rodenticide Act -- with directions for use on food or feed crops or in a manner which is likely to result in residues on food or feed -- he is informed that registration will not be issued until a finite tolerance or exemption is established.

The petitioner then must assemble and submit to the Food and Drug Administration and to the Department of Agriculture adequate residue data to show conclusively the level of residues likely to result. He must also submit adequate safety data to prove that the residues, in or on the food, would be

safe. In addition, the petitioner is required to provide an analytical method that will routinely detect and measure residues of the chemical. The analytical method must be usable in regulatory programs.

The Department of Agriculture evaluates the data and the proposed labeling. It certifies to the Food and Drug Administration that the pesticide is satisfactory for the proposed use, and expresses an opinion on the adequacy of the residue data. In many cases, the Department will certify usefulness of the pesticide, but may require changes in the label prior to final registration. Specialists in the Food and Drug Administration then evaluate the chemistry and toxicity data to determine if a tolerance is justified.

If the residue chemistry and safety data are found to be adequate, the tolerance is established and the Department of Agriculture issues a registration.

If the data are determined to be inadequate to justify the proposed tolerance, the Food and Drug Administration will refuse to establish the proposed tolerance and may establish a tolerance at a lower level, or a zero tolerance if the data warrant such action. The Department of Agriculture then grants a registration when justified on the basis of the tolerance established by the Food and Drug Administration.

Upon registration, the Department of Agriculture publishes and distributes the appropriate information in the USDA Summary of Registered Pesticide Uses. The Food and Drug Administration, upon establishment of a tolerance, publishes the appropriate information in the Federal Register.

The Department of Agriculture and the Food and Drug Administration maintain a nationwide surveillance program on pesticides and pesticide residues in interstate commerce. In the Department of Agriculture, a force of 31 inspectors working out of Washington, D.C., and five field stations, systematically inspect and sample pesticides in warehouses and in sales outlets. The pesticides are inspected for registration, adequacy of information on the label, and for other important aspects. The inspectors also sample representative pesticides and submit the samples for chemical analysis and biological activity.

The Food and Drug Administration surveillance programs have been expanded substantially. This agency now collects and examines 25,000 samples annually in addition to such inspections in the growing areas as are necessary to determine the actual practices being followed in the growing areas. Quantitative multi-residue methods of analysis using gas-liquid chromatography at routine sensitivity levels of approximately 0.03 p.p.m. on most crops were in common use beginning July 1963.

The data presented in this report are from samples collected on an essentially random basis where there was no suspicion of excessive residues or misuse of the pesticide chemicals. The findings are considered to be generally representative of the food supply.

In general, during the past 4 years, about one-half of the samples contained residues of one or more pesticide chemicals. About 3 percent of the samples were found to exceed legal tolerances or, in the absence of legal tolerances, administrative guidelines for excessive residues. Wherever possible, foods containing excess residues were removed from the market. Over 75 percent of the individual residues found were below 0.11 part per million, and 95 percent of the residues were below 0.51 part per million. This general pattern is observed when the data are considered by specific pesticide chemical, by food category, by domestic and imported products, or when considered on an annual basis. The average level of residues within a food category was quite low, and the percentage of lots containing residues in excess, to 2 parts per million was very low.

The formulation of adequate pesticide regulations, like any other regulation, must be firmly based on research and use experience. Within the United States, as in many countries, industry, educational institutions, and State and Federal laboratories have utilized their combined efforts to develop, test, and evaluate chemical methods and other methods for pest control.

The U.S. Department of Agriculture conducts, and otherwise supports, comprehensive programs involving pesticides and related activities. The objective is to develop and encourage the use of those means of effective pest control which provide the least potential hazard to man, animals, and their environment.

The Department also supports research in private and public agencies through contracts and grants. Major grant funds are allocated to State Agricultural Experiment Stations and Schools of Forestry through procedures authorized by Congress under the Hatch and McIntire-Stennis Acts.

The pesticide-related research activities of the Food and Drug Administration are designed to support and strengthen the efforts to establish and enforce pesticide residue tolerances. The activities fall into the two major areas of chemical research and biological research.

The chemical research on pesticide residues in foods is two-fold: It involves (1) establishing the chemical identity of the residue, including significant conversion products, and (2) developing, improving, and validating methodology for measuring the amount of such residue.

The development of adequate methodology for the analysis of pesticide residues is a continuing problem and requires a major share of the research effort. The biological research program is directed toward evaluating the hazards of pesticide residues and their conversion products by acquiring information on the effects of these materials on animals and man.

The pesticide regulation system in the United States is effective, and provides protection to the user of the pesticide and the consumer of the commodities treated with pesticides.

REPORT TO THE CONGRESS

Need To Improve Regulatory Enforcement Procedures Involving Pesticides B-133192

Agricultural Research Service
Department of Agriculture

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

SEPT. 10, 1968

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-133192

To the President of the Senate and the
Speaker of the House of Representatives

Here is our report pointing out a need for the Agricultural Research Service of the Department of Agriculture to improve regulatory enforcement procedures involving pesticides.

Copies of this report are also being sent to the Director, Bureau of the Budget, and to the Secretary of Agriculture.

Elmer B. Staats

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

NEED TO IMPROVE REGULATORY ENFORCEMENT PROCEDURES INVOLVING PESTICIDES

Agricultural Research Service
Department of Agriculture B-133192

D I G E S T

WHY THE REVIEW WAS MADE

The Agricultural Research Service (ARS) is responsible for enforcing the Federal Insecticide, Fungicide, and Rodenticide Act--the basic consumer protection law in the area of pesticides. The law requires that all pesticide products shipped across a State line be safe and effective and be registered with ARS before being sold to the public.

To ensure that products being sold comply with the law, ARS obtains samples of products and tests them. Under the law, ARS may take action to remove products from the market, cancel the registration of products, and report to the Department of Justice for prosecution those who ship products that violate the law.

Because over 60,000 pesticide products are registered with ARS--virtually affecting every segment of the public--the General Accounting Office (GAO) wanted to find out how the law was being enforced to protect the public.

FINDINGS AND CONCLUSIONS

GAO found that, in taking action at locations against misbranded, adulterated, or unregistered products, ARS, with few possible exceptions, did not obtain quantity and shipping data to determine whether shipments of the same products were available to the public in other locations.

As a result, the actions taken may not have removed from the market products which, in some instances, were potentially harmful. (See pp. 8 to 13.)

GAO found that ARS operating guidelines did not include procedures for determining when shippers which had apparently violated the law would be reported to the Department of Justice for prosecution. There have been no actions by ARS to report violators of the law for prosecution in 13 years. This was true even in instances where repeated major violations of the law were cited by ARS and when shippers did not take satisfactory action to correct violations or ignored ARS notifications that prosecution was being contemplated. (See pp. 14 to 18.)

GAO found also that, at the time of its review, ARS was not publishing the notices of judgments of the courts ordering products off the market as required by the law. (See pp. 22 to 23.)

RECOMMENDATIONS OR SUGGESTIONS

GAO is recommending that ARS establish and implement procedures to provide for:

--obtaining shipping and product data,

--reporting violators of the law for prosecution, and

--publishing notices of judgments.

AGENCY ACTIONS

ARS has agreed to obtain the data necessary to support actions to remove products from the market and to use the data as a basis for obtaining samples and other documentary information on the product at every location possible, in order to remove the maximum amount of the product from the market.

ARS has revised its operating guidelines concerning shippers to now require that cases be forwarded for prosecution in instances where (1) the evidence indicates that the violation was willful, (2) the violation is of a serious nature and is the result of apparent gross negligence, or (3) the company has engaged in repeated violations.

ARS has made plans to publish the backlog of notices of judgments as soon as possible and to publish future notices at least every 6 months.

ISSUES FOR FURTHER CONSIDERATION

None.

LEGISLATIVE PROPOSALS

None.

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COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

NEED TO IMPROVE REGULATORY ENFORCEMENT PROCEDURES INVOLVING PESTICIDES
Agricultural Research Service
Department of Agriculture B-133192

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ISSUES FOR FURTHER CONSIDERATION

None.

LEGISLATIVE PROPOSALS

None.

INTRODUCTION

The General Accounting Office has reviewed the manner in which the Agricultural Research Service, Department of Agriculture, has carried out regulatory enforcement activities to prevent the interstate marketing of unregistered, adulterated, or misbranded pesticides. Our review, made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67), was directed primarily toward an evaluation of the administration of pesticide enforcement activities, rather than to an evaluation of the administration of other Department or ARS activities involving pesticides.

Because over 60,000 pesticides products are registered with ARS--virtually affecting every segment of the public--we wanted to find out how ARS carries out regulatory enforcement activities to protect the public. Our review covered the enforcement actions initiated by ARS during fiscal year 1966 as well as related events occurring during the period February 1955 through May 1968. The scope of our review is described more fully on page 25.

BACKGROUND

It is the policy of the Department of Agriculture to encourage the use of those means of effective pest control which provide the least potential hazard to man and animals. According to the Department, pesticides are generally the most effective and, in many instances, the only available means for fighting pests that are destructive or endanger human health. In protecting man, animals, plants, farm and forest products, communities, and households against depredation by pests, the Department has a vital concern for the health and well-being of people who use pesticides and those who use products protected or treated by pesticides.

Statistics published by the Department indicate the importance of pesticides as well as the scope of their use in this country. The Department reported that during 1965 nearly $1 billion worth of pesticides were used in the protection of agricultural and forest products, that crop and

livestock production in the United States would drop by about 25 to 30 percent if pesticides were to be completely withdrawn from farm use, and that approximately 15 percent of all pesticides sold were purchased for home and garden use--a total of over 50 million pounds of product preparations.

Major programs of the Department--many of which are conducted in cooperation with State and local governments, other Federal agencies, educational and private organizations, and industry--are used in carrying out policy objectives. In addition to Federal laws and regulations to govern the movement and sale of pesticides in interstate commerce, there are programs of the Department which include maintaining quarantine barriers against foreign pests, monitoring pesticide residue levels in meat and poultry products, and conducting research and public education and information programs to find better and safer pest control methods and to promote the safe use of pesticides.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947 (7 U.S.C. 135-135k) provides the basic legal authority for regulating the interstate marketing of pesticides to protect the interests of both the user of pesticides and the consumer of products protected by pesticides. The Secretary of Agriculture is responsible for administering and enforcing the FIFRA. Authority for implementing the FIFRA is delegated to the Pesticides Regulation Division of the Department's Agricultural Research Service.

In addition to the FIFRA, related Federal laws concerned with safeguarding the public affect pesticide products. For instance, certain provisions of the Federal Food, Drug, and Cosmetic Act of 1938 (21 U.S.C. 301) directly affect the registration of pesticides. This act, which regulates the amount of residue that may remain after the use of pesticides on food commodities moving in interstate commerce, is administered by the Food and Drug Administration of the Department of Health, Education, and Welfare.

Also, individual States have laws and regulations on the sale of pesticides within State borders. An example is the Uniform State Insecticide, Fungicide, and Rodenticide Act developed by the Council of State Governments and adopted

by most States. The uniform State act, which parallels the FIFRA, facilitates cooperation between State and Federal officials in enforcing uniform regulations.

The FIFRA provides that every commercial pesticide formulation must be registered with the Department of Agriculture before it can be sold in interstate commerce. According to the Department, over 60,000 pesticide formulations based on more that 900 individual chemical compounds have been registered during the last two decades. Before registration is granted, a pesticide must meet tests which prove its claimed effectiveness against a particular pest or pests and demonstrate its safety when used as directed.

As part of the registration requirements, the Department of Agriculture regulates the contents of labels for pesticide products under the provisions of section 4 of the act. Federal regulations require that warning and cautionary statements be displayed on the labels of pesticides. The nature and scope of the safety claim on the label must conform to proven facts, and all labels must bear registration numbers indicating that the product has been accepted by the Department as adequate to permit both safe and effective use when container directions are followed.

To enforce compliance with the provisions of the FIFRA, ARS field inspectors, aided by deputized State inspectors, obtain sample products to be checked for violations of pesticide registration and labeling regulations. Products are submitted to Federal laboratories for analysis and testing. In this manner, ARS determines whether the products being marketed are as represented at the time of their original registration with the agency for marketing in interstate commerce.

Section 5 of the law provides authority to the Secretary of Agriculture for access to all records showing the delivery, movement, or holding of pesticide products, including quantities of shipments, dates of shipments and receipt of goods, and names of consignors or consignees of shipments.

Violations of the FIFRA include lack of Federal registration, adulteration, and misbranding of pesticide products.

In cases of violations of law, ARS is authorized by the FIFRA to (1) take action to remove the illegal shipment from the location where it is found (seizure action), (2) cancel the registration of the product, (3) report to the Department of Justice for criminal prosecution the person(s) alleged to be responsible for violating the act, or (4) use a combination of these actions. The act also requires ARS to notify the person(s) against whom criminal proceedings are contemplated.

The act provides that the seizure of products or the prosecution of violators is not required in the event that ARS determines that the violation is minor and the public interest will be served adequately by a written notice of warning. The act provides also for the publication of all judgments of the courts to seize products or to prosecute shippers under its authority.

In fiscal year 1966, ARS tested and reviewed 2,751 samples of pesticide products. As a result of the work performed, ARS reported that 750 samples were found to be in violation of the FIFRA and that 562 of the 750 samples were in major violation of the law. The samples determined by ARS to be in major violation of the law--cases that warranted such action as seizure or prosecution--represented about 20 percent of all the samples that were tested and reviewed in fiscal year 1966.

Enforcement actions taken in fiscal year 1966 included 106 actions by ARS to remove misbranded, adulterated, and unregistered products from the market as well as three actions by ARS to cancel the registration of products. During the same period there were no enforcement actions by ARS to report violators of the FIFRA for prosecution.

The principal officials of the Department of Agriculture responsible for the administration of pesticide enforcement activities are listed in appendix I to this report.

FINDINGS AND RECOMMENDATIONS

NEED TO ESTABLISH PROCEDURES INVOLVING PESTICIDE ENFORCEMENT ACTIONS

On the basis of our review, we believe that there is a need for ARS to establish procedures for strengthening pesticide enforcement actions that may be taken against misbranded, adulterated, or unregistered products or the shippers of such products.

We found that, in taking action against products, ARS, with few possible exceptions, did not obtain product quantity and location data to determine whether other shipments of the same misbranded, adulterated, or unregistered products were available to the public in other locations. As a result, the enforcement actions taken may not have removed violative and, in some instances, potentially harmful products from the market.

In our opinion, the product quantity and location data of the shippers is needed by ARS to (1) evaluate the adequacy of its enforcement actions, (2) determine the types of supplemental actions, if any, that may be necessary to protect the interests of the public, and (3) facilitate efforts to locate and remove undesirable products from the market.

We found also that ARS internal operating guidelines did not set forth the procedures to be used for determining when shippers that had allegedly violated the law would be reported to the Department of Justice for prosecution.

In this connection, we noted that there had been no enforcement actions by ARS to report violators of the FIFRA for prosecution in 13 years, even in instances where repeated major violations of the law were cited by the agency and when shippers did not take satisfactory action to correct violations or ignored ARS notifications that prosecution was being contemplated.

In our opinion, the lack of action by ARS to report firms for prosecution in serious or repeated cases could indicate to the shippers involved--as well as to other

shippers of pesticide products--that major violations of the law would be treated with minimum consequence. Moreover, any advantages attached to the value of prosecutions as a deterrent to future violations of the law would be nullified.

In June 1967, the Department of Agriculture proposed legislation to the Congress to amend the FIFRA which, if enacted and properly implemented, should tend to achieve generally more effective regulation of pesticides. The proposed legislation was pending in the Congress as of May 1968.

In our opinion, however, improved enforcement of the FIFRA also requires the establishment and implementation of procedures under existing provisions of the act. The details of our findings are discussed below.

Enforcement actions may not have resulted in the removal of misbranded, adulterated, or unregistered products from the market

Our review showed that, in taking 106 seizure actions in fiscal year 1966, ARS, with few possible exceptions, did not obtain product quantity and location data to determine whether other shipments of the same misbranded, adulterated, or unregistered products were available to the public in other locations. Similarly, we found that ARS action to cancel the registrations of certain products in fiscal year 1966 was not supplemented by action to obtain information bearing upon the quantities and locations of the products that had previously entered marketing channels. Section 5 of the FIFRA authorizes ARS to obtain such information from manufacturers, distributors, carriers, dealers, or any other person who sells, delivers, receives, or holds any product subject to the act.

Our review showed that ARS did not have procedures or standards for obtaining shipping and product information from the records of shippers of products. We found that generally it was ARS practice to remove from the market only the amount of the product, if any, on hand at the one retail or wholesale outlet where the sample was collected. We found further that ARS inspectors were using the

authority of section 5 of the FIFRA to establish from the records of the one retailer or wholesaler the fact that interstate shipment had been made of the particular stock from which the sample was taken.

According to ARS, the actions to seize products during fiscal year 1966 involved seven major types of pesticide products.

Type	Number of seizure actions
Agricultural insecticides	26
Disinfectants	38
Fungicides	1
Herbicides	13
Animal insecticides	12
Miscellaneous insecticides	14
Animal biology	2
Total	106

Also, ARS reported in program publications that the actions to take products off the market were a significant part of the protection being given the public under the provisions of the FIFRA.

We found that 84 of the 106 seizure actions (involving 79 different products) resulted in the removal of part or all of the stock from the locations from which samples were taken; however, in 22 of the 106 seizure actions (about one out of every five such actions) the removal from the market of any quantity of the product was not accomplished inasmuch as the product was no longer on the shelves or in storage at the one location where the sample was collected when the seizure was attempted.

We found further that the 79 different products which had been seized were seized at only 80 different wholesale or retail outlets throughout the United States and that ARS did not obtain shipping location and product quantity information from the records of shippers of products, even though the products could be sold nationally.

An example follows which we believe illustrates the need for ARS to better use its authority to obtain shipping location and product quantity information in order to provide better protection to the public.

On March 9, 1966, ARS seized 11 one-gallon containers of a liquid spray insecticide from an outlet in Santa Fe, New Mexico, because the product was contaminated with a toxic ingredient not named on the container. Subsequent to the seizure, the manufacturer of the product was notified by ARS of the violation of the FIFRA. On March 30, 1966, the manufacturer advised ARS that the wrong label had been applied to the product and that procedures had been revised to avoid repetition of the error.

On April 22, 1966, ARS informed the manufacturer that the mislabeling of the product had resulted in a very dangerous situation since a purchaser would be using a much more hazardous chemical than he believed he had purchased. ARS stated that the product was not acceptable as labeled because of the increased danger of inhalation and skin absorption and requested more information regarding the procedures taken to avoid a repetition. In addition, ARS asked for information regarding the steps taken to recall any other outstanding stocks that may have been similarly mislabeled.

The manufacturer's reply to ARS on May 18, 1966, outlined the steps that had been taken to prevent a recurrence of the violation but contained no information on actions taken to recall any other outstanding stocks of the product that may have been similarly mislabeled. Despite the absence of this information, ARS notified the manufacturer on May 27, 1966, that any further action with respect to the case need not be taken.

ARS closed the case on June 7, 1966, without establishing the quantity or location of similarly deficient products that may have been available to the public.

Our review showed that, in addition to seizures in fiscal year 1966, three enforcement actions were taken by ARS involving the cancellation of certain uses of registered products containing specific chemical ingredients.

For instance, ARS canceled the registrations for use on certain crops of 475 products containing the chemicals aldrin and dieldrin when new scientific developments became available to justify changes in the registered labeling of products containing those chemicals. We found further that, in the interest of public safety, ARS canceled the registrations of 58 products containing the chemical thallium.

Our review of the cancellation of the registrations of the products containing thallium showed that the action was taken by ARS because the general use of such products had resulted in numerous accidents. According to ARS, thallium had been used in bait material for the control of insects and rodents for a number of years; however, a number of deaths had occurred, principally in children, as a result of accidental consumption of the bait material.

In June 1960, ARS took action to limit the thallium content of products in an attempt to reduce the possibility of fatal accidents associated with the use of such products. In spite of the limitation, deaths continued to occur as a result of accidental ingestion of the products. In addition, statistics of the Public Health Service indicated that there were about 400 reported cases of thallium poisoning of children during 1962 and 1963.

On August 1, 1965, ARS notified manufacturers, formulators, distributors, and registrants that the registrations of products containing thallium were being canceled. The cancellations involved 45 registrants and 58 thallium products. According to ARS, the action was taken as a result of the continuing number of accidents associated with the general use of the products. The effective date of the cancellation of the registrations of the products containing thallium was 30 days after the registrants received the notice of August 1, 1965.

Our review showed that the action in August 1965 to cancel the registration of the products involved was not supplemented by action to obtain information on the quantities and locations of products that had previously entered marketing channels. We found that, subsequent to the cancellation of the registrations, thallium products continued to be available for public consumption and that

efforts ARS made to protect the public, such as attempts to locate thallium products, were being made without knowing the locations or quantities of the products involved. We found also that a product containing thallium was still available to the public in January 1968 and that the extent and duration to which such products remained available to the public were unknown.

Our review showed that in November 1966--14 months after the cancellation of registrations--an ARS memorandum of instructions to agency field inspectors discussing the availability of thallium products stated that:

> "Recent reports indicate that these products are still available at the retail level. Please increase your surveillance of hardware, drug, grocery, novelty stores etc. to determine if they are still on the shelves. If encountered and the shipment was made prior to August 1965, you may be able to get the dealer to voluntarily destroy the merchandise. If not, you should bring the matter to the attention of the local authorities. If the shipment was made after August 1965, we can take action based on a violation of the Federal Insecticide, Fungicide, and Rodenticide Act. In either case, you should check the wholesaler or distributor from whom purchased to determine if larger sized lots are available. Seizure action will be taken when possible." (Underscoring supplied.)

Our review showed that ARS inspectors located 15 lots of products containing thallium during the period January 1 through June 30, 1967. ARS identified three of the 15 lots as shipments made subsequent to September 1, 1965, and took action to remove them from the market. We found further that the remaining 12 lots were identified by ARS as shipments made prior to September 1965 and that six of the 12 lots were voluntarily destroyed by the dealer, three lots were referred to State authorities when the dealer refused to voluntarily destroy the merchandise, and three lots were removed from sale by the dealer pending return to the shipper for credit.

On August 9, 1967, a representative of the General Accounting Office visited about 20 retail stores in Washington, D.C., to determine whether products were being sold in violation of Federal law. As a result, about 100 packages of a product containing thallium were located and brought to the attention of ARS. The merchandise, which had been on the market prior to the cancellation of the registrations in 1965 was removed from the market on August 31, 1967.

After notifying ARS of the availability of the thallium products, we noted that an agency inspector canvassed 22 additional retail stores in Washington, D.C., and suburban Maryland. The inspector located products containing thallium in six, or about 27 percent, of the 22 outlets visited. Furthermore, on January 29, 1968, a representative of our Office located about 65 more packages of a product containing thallium in suburban Maryland. The products in these instances--as previously--had been in marketing channels prior to the cancellation of the registrations.

We were informed by ARS officials that, because of the continuing availability to the public of thallium products, three firms were requested in 1967 to make an effort to locate and remove from the market stocks of products containing thallium. We were informed also that ARS would continue its surveillance for thallium products until such products could no longer be found.

We believe that, under the provisions of the FIFRA, appropriate information pertaining to locations and quantities of products could have been obtained by ARS in conjunction with its enforcement actions to seize products and to cancel the registrations of the thallium products. In our opinion, such information would be needed by ARS to (1) evaluate the adequacy of its enforcement actions, (2) determine the types of supplemental actions, if any, that may be necessary to protect the interests of the public, and (3) facilitate efforts to locate and remove undesirable products from the market.

Alleged violators of the FIFRA not reported for prosecution

Our review showed that during the 13-year period from February 1955 through February 1968, alleged violators of the FIFRA were not reported to the Department of Justice for prosecution even though, in some instances, prosecution of such violators, in our opinion, appeared warranted.

We found that, during fiscal year 1966, ARS notified 242 shippers of pesticide products that criminal proceedings against them were contemplated. The charges to be brought against the 242 shippers involved 456 samples of products that were determined by ARS to be in major violation of the act. We found that 77, or about 32 percent, of the shippers were responsible for 291, or about 64 percent, of the samples violating the law. According to ARS records, each of the 77 shippers had violated the law on more than one occasion in fiscal year 1966 and two of the shippers were known by ARS to have violated the law on 20 separate occasions during this period, as illustrated by the following table.

Number of shippers	Number of samples in violation per shipper
2	20
1	10
1	8
4	7
3	6
6	5
12	4
13	3
35	2
77	

In our opinion, such statistics indicate that misbranded, adulterated, or unregistered products are shipped most often by the same firms.

According to ARS internal operating guidelines, action to report violators for prosecution is resorted to only

when all other methods have failed to obtain required corrections, such as when a firm has had several major violations and apparently has made little or no effort to bring its products into compliance with the act. In accordance with section 6.c. of the FIFRA, the purpose of the notification of contemplated prosecution is to list the alleged violations and to offer a firm an opportunity to make any explanation desired within 20 days.

During our review, we noted a lack of action by ARS to report firms for prosecution even in instances when notifications of contemplated prosecutions were ignored.

For instance, our review showed that ARS collected a sample of a hospital disinfectant in Portland, Oregon, on January 25, 1965. The shipping records collected with the sample indicated that the product was shipped to the dealer in Portland from the manufacturer in Chicago, Illinois, during June and October 1964. The sample, a report of the collection, and shipping records related to the containers at the one location in Portland were sent on January 29, 1965, to an ARS bacteriology laboratory in Beltsville, Maryland.

On February 19, 1965, ARS completed its analysis of the sample. The analysis showed that the product was in violation of the FIFRA because, when used as directed, it could not be relied upon to kill a bacteria (staphylococcus) that causes drug-resistant bacterial infection, although this claim was made on the label. On March 4, 1965, ARS, as a result of the analysis, determined that the product was not effective as a hospital disinfectant and that enforcement action should be instituted.

On June 1, 1965, ARS informed the shipper of the disinfectant that prosecution under the provisions of the FIFRA was contemplated for shipping a product in violation of the law. In response to ARS, the shipper requested on August 3, 1965, that a sample of the deficient product be made available for analysis so that a confirmation or denial of the ARS charges could be made.

On September 14, 1965, ARS sent a sample of the deficient product to the shipper and informed him that his case

would be held open for the time necessary to study and comment on the sample. In a letter dated December 20, 1965, ARS again informed the shipper that the case was being held open and that the receipt of his explanation to the contemplated prosecution was pending. We noted, however, that in a memorandum dated March 4, 1966, ARS, in discussing the contemplated prosecution, concluded that the examination of samples from future shipments of the product should be made. ARS stated that:

> "A subsample of our official sample was forwarded on September 14, 1965 for his [shipper's] confirmation of sample failure. We have not received any reply to this letter nor to our follow-up letter of December 20, 1965. In view of the fact that the firm has had ample time to run tests to confirm our findings to their satisfaction, and has not replied to our follow-up letters above, it is recommended that this case be placed in Temporary Abeyance [held open] pending examination of samples from future shipments of the product."

Our review showed that on June 15, 1965, ARS had collected another sample of the hospital disinfectant from a different shipment to the same dealer in Portland, Oregon. The sample was sent on June 18, 1965, to the bacteriological laboratory in Beltsville, Maryland. On July 16, 1965, the laboratory reported that the product was again in violation of the FIFRA in that the labeling made claims to being a disinfectant which kills an antibiotic resistant bacteria; whereas, when used as directed, the product would not kill the bacteria or disinfect hospital instruments, utensils, and equipment or hospital operating rooms, delivery rooms, nurseries, maternity wards, and patient rooms. The laboratory report recommended that the product be seized and the shipper of the product be notified of ARS's intention of prosecuting him in an action separate from the seizure of the product.

On July 30, 1965, ARS, in justifying the need for the enforcement actions, stated that:

> "The product is represented as a hospital disinfectant. *** When used as directed, the product would not be effective as a hospital disinfectant. A previous sample of this product I.D. No. 47076, was obtained at the same dealer and found to be ineffective."

On August 30, 1965, ARS informed the shipper that prosecution under the provisions of the FIFRA was also contemplated for shipping the second disinfectant. In a follow-up to this contemplated prosecution, ARS, in an October 22, 1965, letter to the shipper, stated that:

> "No reply has been received and the matter is being called to your attention in the belief that it may have been overlooked. We should point out that once a regulatory action of this type has been initiated, we do not have the authority to hold the matter open indefinitely."

We noted, however, that on March 22, 1966, ARS again determined that additional samples should be collected and that the case would be held open.

Our review showed that during fiscal year 1966 ARS collected 127 samples of products manufactured by the shipper, of which 36, or about 28 percent, were determined by ARS to be in violation of the FIFRA. Our review showed further that the shipper was notified of contemplated prosecutions on six separate occasions involving 20 samples that were determined by ARS to be in major violation of the law. We found, however, that in no instance was the enforcement action taken to report the shipper to the Department of Justice for prosecution. Moreover, we noted that, from the end of fiscal year 1966, the shipper of the hospital disinfectant had continued to violate the provisions of the FIFRA.

For instance, we noted that in October 1966, ARS canceled the registration of the hospital disinfectant. The cancellation was made pursuant to the failure of the manufacturer to comply with revised labeling requirements of the FIFRA. The changed labeling requirements were brought about by an amendment to the FIFRA on May 12, 1964, and

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revisions of the regulations under the FIFRA. The manufacturer was notified of the new labeling requirements on September 15, 1964, December 7, 1965, and August 1, 1966. Nevertheless, our review showed that in August 1967, ARS collected a sample of the unregistered product that was shipped in interstate commerce during May 1967.

The sample was tested by ARS on September 21, 1967. The laboratory tests showed--as on previous occasions--that, in addition to being unregistered, when the product was used as directed, it could not be relied upon as a hospital disinfectant. The laboratory report again recommended that the shipper be informed of a contemplated prosecution. We found, however, that on January 23, 1968, ARS determined that this case also would be held open pending the examination of additional samples.

Our review showed that in other instances also shippers ignored ARS notices of contemplated proceedings or did not explain the causes of violations to the satisfaction of the agency. We noted, however, that the ARS internal operating guidelines did not set forth the follow-on procedures to be used to determine when shippers that had allegedly violated the law would be reported to the Department of Justice for prosecution.

We believe that the lack of enforcement action by ARS concerning the prosecution of shippers could impair the achievement of the objective of pesticide regulation enforcement to protect the interest of the public. In our opinion, the lack of action by ARS to report firms for prosecution in serious or repeated cases could indicate to the shippers involved--as well as to other shippers of pesticide products--that major violations of the law would be treated with minimum consequence. Moreover, any advantages attached to the value of prosecutions as a deterrent to future violations of the law would be nullified.

Legislation proposed
to improve regulation of pesticides

Our review showed that legislation proposed by the Department of Agriculture to amend the FIFRA to provide for

more effective regulation under the act was introduced in the Senate on June 29, 1967 (S. 2057, 90th Cong.), and in the House of Representatives on July 27, 1967 (H.R. 11846, 90th Cong.).

The identical legislation introduced in both houses would add new tools with which to enforce the FIFRA. The amendment, which was pending in the Congress as of May 1968, would require registration of all establishments engaged in making pesticides; permit inspection of establishments as well as conveyances being used to transport, sell, or hold pesticides in interstate commerce; and provide additional controls, civil penalties, and injunctive authority to enforce and restrain violations of the act.

According to the Department, the provision for registering establishments calls for the suspension of such registration if the establishments are not conducting operations in accordance with good manufacturing practice. Authority for factory inspection would make it possible for the Department to inspect the operations of a company to ascertain whether proper materials, precautions, and controls were being used.

The Department, in discussing the proposed legislation, reported to the Congress that, under the provision for civil penalties, violations could be handled which were of sufficient importance to warrant some action other than a written notice of warning, as presently provided for in the FIFRA, but not of such nature as to warrant criminal prosecution. Moreover, as stated by the Department, injunctive authority would make it possible to more effectively carry out the responsibility of the Department to prevent the interstate movement of pesticides.

On the basis of our review, we believe that the legislation proposed by the Department would add valuable tools with which to enforce the FIFRA and, if enacted and properly implemented, should tend to achieve more effective regulation of pesticides. In our opinion, however, achieving proper enforcement of the FIFRA should include also the implementation of improved procedures under existing provisions of the law.

Conclusion

On the basis of our review, we believe that there is a need for ARS to establish procedures for strengthening pesticide enforcement actions that may be taken against misbranded, adulterated, or unregistered products or the shippers of such products.

We found that, in taking actions against products, ARS, with few possible exceptions, did not obtain product quantity and location data to determine whether other shipments of the same misbranded, adulterated, or unregistered products were available to the public in other locations.

In our opinion, the product quantity and location data of the shippers is needed by ARS to (1) evaluate the adequacy of its enforcement actions, (2) determine the types of supplemental actions, if any, that may be necessary to protect the interests of the public, and (3) facilitate efforts to locate and remove undesirable products from the market.

We found also that ARS internal operating guidelines did not set forth the procedures to be used for determining when shippers that have allegedly violated the law would be reported to the Department of Justice for prosecution.

In our opinion, the lack of action by ARS to report firms for prosecution in serious or repeated cases could indicate to the shippers involved--as well as to other shippers of pesticide products--that major violations of the law would be treated with minimum consequence. Moreover, any advantages attached to the value of prosecutions as a deterrent to future violations of the law would be nullified.

Recommendation to the Administrator, Agricultural Research Service

We recommend to the Administrator of ARS that procedures be established and implemented involving the taking of enforcement actions, particularly with respect to (1) obtaining shipping and product data and (2) reporting violators of Federal law for prosecution.

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By letter dated May 22, 1968 (see app. II), the Acting Administrator, ARS, commented on the need for establishing procedures involving pesticide enforcement actions, as discussed in this report, and agreed with our findings and recommendations.

In outlining the steps taken with respect to removing violative products from the market, the Acting Administrator commented on the use of seizure actions as well as the use of recalls by the manufacturers of products. The Acting Administrator stated that, in instances where a shipper refused to voluntarily recall a product from the market, ARS would (1) obtain data concerning shipments of the product from the shipper or manufacturer as a first step in obtaining the evidence necessary to support seizure actions and (2) use shipping data as a basis for obtaining samples and other documentary information relative to the product at every location possible with a view toward initiating the maximum number of seizure actions.

In commenting on the need to establish procedures involving the prosecution of shippers, the Acting Administrator stated that the present operating guidelines require that cases be forwarded for prosecution in instances where (1) the evidence indicates that the violation was willfull, (2) the violation is of a serious nature and is the result of apparent gross negligence, or (3) the company has engaged in repeated violations.

The Acting Administrator stated also that a prosecution file related to the shipper of the hospital disinfectant discussed on pages 15 to 18 of this report had been prepared by ARS and was currently being processed.

NEED TO ESTABLISH PROCEDURES INVOLVING PUBLICATIONS OF NOTICES OF JUDGMENTS

On the basis of our review, we believe that there is a need for ARS to establish procedures which specify the frequency of publishing notices of judgments of the courts in cases arising under the provisions of the FIFRA. Section 6.e. of the FIFRA requires that the Secretary of Agriculture, by publication in such manner as he may prescribe, give notice of all judgments entered in actions instituted under the authority of the act.

According to ARS, which has been delegated the authority of prescribing procedures necessary for the publication of the judgments, the purpose of the publications is to disseminate to the public--principally through libraries--the results of court decisions involving pesticide products and the shippers of pesticide products. The publications include information as to the specific violations of the FIFRA, the dates various legal actions are taken, and the final decree of the court regarding the disposition of seized goods and the penalty imposed on the violator.

Our review showed that ARS had not established procedures to implement the provisions of section 6.e. of the FIFRA. We found that, from the inception of the FIFRA in 1947, 18 publications summarizing the results of 515 judgments had been issued by ARS. Our review of the 10 most recent publications showed that such documents had been approved for publication at intervals averaging about 6 months. We noted also that the number of judgments per publication ranged from a low of 15 to a high of 35 and that a total of 245 judgments had been summarized in the documents.

We found, however, that the last such document had been approved for publication by ARS in November 1964 and that as of December 1967 there was an accumulation of about 250 judgments of various Federal district courts throughout the country which had not been published. There follows, for this period, a summary showing for 6-month periods the number of unpublished judgments that became available for dissemination.

From		Through		Unpublished
Month	Year	Month	Year	judgments
Prior to January	1965			32
January	1965	June	1965	20
July	1965	December	1965	21
January	1966	June	1966	34
July	1966	December	1966	27
January	1967	June	1967	59
July	1967	December	1967	57
Total				250

Moreover, we noted, from projections by ARS, that enforcement actions involving future judgments of the courts are expected to total about 900 during the period of fiscal year 1968 through fiscal year 1970.

On October 26, 1967, we were informed by an ARS official that continuation of the publications had been neglected after the employee assigned to compiling information necessary to the issuance of the documents had retired. However, subsequent to our bringing the matter to the attention of ARS, we were informed further that action to resume the publications was being taken.

It is our view that disseminating information on decisions involving pesticide products and shippers of pesticide products that violate the law contributes to the education and welfare of users and prospective users of pesticides as well as of other segments of the public. We therefore believe that procedures should be established by ARS to ensure that such information is published and made available, to the maximum extent practicable, on a frequent and regular basis.

Recommendation to the Administrator, Agricultural Research Service

We recommend to the Administrator of ARS that procedures specifying the frequency of future publications of notices of judgments be established and implemented.

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In his letter of May 22, 1968, the Acting Administrator informed us that he anticipated that the backlog of notices of judgments would be published by December 31, 1968, and that thereafter ARS would publish notices of judgments at intervals of not more than 6 months.

SCOPE OF REVIEW

We reviewed (1) the legislative history and authority which established the pesticide enforcement activity, (2) pertinent policies, procedures, and practices established by the Department and ARS for carrying out enforcement actions to seize products, prosecute shippers, and cancel product registrations, and (3) certain information of the Food and Drug Administration and the Public Health Service, Department of Health, Education, and Welfare related to enforcement activities.

Our review, performed principally in the offices of the Pesticides Regulation Division of ARS at Washington, D.C., included visits to retail outlets selling pesticides in the States of Maryland and Virginia and in the District of Columbia.

APPENDIXES

APPENDIX I

PRINCIPAL OFFICIALS OF

THE DEPARTMENT OF AGRICULTURE

RESPONSIBLE FOR ADMINISTRATION

OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF AGRICULTURE		
SECRETARY OF AGRICULTURE:		
Orville L. Freeman	Jan. 1961	Present
DIRECTOR OF SCIENCE AND EDUCATION:		
Nyle C. Brady	Dec. 1963	Aug. 1965
George L. Mehren (note a)	Sept. 1965	Present
AGRICULTURAL RESEARCH SERVICE		
ADMINISTRATOR:		
Byron T. Shaw	June 1954	Mar. 1965
George W. Irving, Jr.	Mar. 1965	Present
DEPUTY ADMINISTRATOR, REGULATORY AND CONTROL:		
Robert J. Anderson	Mar. 1963	Nov. 1966
Francis J. Mulhern (acting)	Jan. 1967	May 1967
Francis J. Mulhern	May 1967	Present
DIRECTOR, PESTICIDES REGULATION DIVISION:		
Justus C. Ward	Nov. 1961	June 1966
Harry W. Hays	July 1966	Present

[a]By a memorandum dated October 5, 1965, the Secretary of Agriculture delegated the duties and responsibilities of the Director of Science and Education to Dr. George L. Mehren, Assistant Secretary for Marketing and Consumer Services, pending the appointment of a new Director.

APPENDIX II
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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
WASHINGTON, D.C. 20250

OFFICE OF ADMINISTRATOR

MAY 22, 1968

Mr. Victor L. Lowe
Associate Director
United States General
Accounting Office
Washington, D.C. 20548

Dear Mr. Lowe:

This is in response to your request for our comments on the draft of your proposed report to the Congress on the need to improve regulatory enforcement procedures involving pesticides, Agricultural Research Service, Department of Agriculture.

First of all, let me say that we appreciate the opportunity to comment on your report. We also appreciate the spirit in which your investigation was conducted and the attitude of the members of your staff who participated in the investigation. Your investigation is in harmony with, and supplementary to, our own continuing study of our enforcement policy and procedures under the Federal Insecticide, Fungicide, and Rodenticide Act. And the objectives of your recommendations, as set forth in your report, coincide with our aims in effectively carrying out the provisions of the Act. I am sure that the findings in your report will be of benefit to us in our future evaluations of enforcement activities under the Act.

The principal findings in your report are (1) that enforcement actions may not have removed misbranded, adulterated, or unregistered products from the market, (2) that repeated violators of the Federal Insecticide, Fungicide, and Rodenticide Act have not been prosecuted, (3) that proposed legislation, if enacted and properly implemented, would achieve generally more effective regulation of pesticides, and (4) that there is a need to establish procedures involving publications of notices of judgments. We cannot disagree with these findings. In fact, we have recognized the need for more effective enforcement action in the areas covered by your report and have taken steps which we believe will greatly strengthen and improve our enforcement program in these areas.

In your meetings on the proposed report with members of our staff, you have emphasized the desirability for a direct response to the report. In view of what has been said above, we do not feel it necessary to comment in detail on your basic findings. Instead, we believe that the most direct response to your report is to inform you of the significant

changes which have been made in our enforcement policy and practice since the period covered by your investigation, and of our present enforcement activities as they relate to the matters referred to in the report.

In setting forth certain of the changes which have taken place in our enforcement policy and practice, we wish to emphasize that we are still in a transitional stage. As you are aware, the changes which we are making require time--and personnel--to fully accomplish. Because of present personnel limitations and budget questions, we are unable to accurately pinpoint how and when we will be able to completely implement the enforcement policy which is presently in effect. However, we hope the discussion below will not only inform you of our present policy and practice in the areas covered by your report, but also inform you of additional steps we intend to take in these areas.

I. Removal of Violative Products from Market

A. Seizure and Recall Actions

Section 9 of the Act authorizes the seizure of products found to be in violation of certain provisions of the Act. This is the only direct authority in the Act for the removal of violative products from channels of trade.

Seizure actions under the Act have increased as our sampling program and analytical work have increased. In fiscal 1967, 189 seizure actions were initiated. During the first six months of fiscal 1968, 240 seizures were processed. We believe that this increased seizure activity has had an effect beyond the removal of violative products from the market. In our opinion, there has been a commensurate increase in the awareness on the part of industry that enforcement is being emphasized under the Act. This opinion is based primarily upon the numerous telephone calls and meetings we have had relative to our seizure actions, and the representations by members of industry of their desire to cooperate with the Department in our efforts to carry out the provisions of the Act.

However, in spite of this notable increase in the number of seizures under the Act, we recognize that the effectiveness of seizure actions is limited by the nature of the enforcement action itself. Due to the length of time which it takes to process actions in this Department and the United States Attorneys' offices, there are inevitably a certain number of cases in which seizure action is recommended but where no product is found to seize. In addition, only the particular amount of product from which a sample is obtained is affected by any one seizure action.

During the past year we have reviewed, and we are continuing to review, our seizure program with a view toward making more effective use of our seizure authority. We do not believe that exercise of our seizure authority, in and of itself, can effectively remove all violative products from the market. We do believe, however, that the seizure authority can be an effective enforcement tool when used in conjunction with, and as an integral part of, other enforcement procedures.

The Federal Insecticide, Fungicide, and Rodenticide Act contains no provision relating to the recall of products. However, we believe that cooperative action by a manufacturer in recalling defective or hazardous products is the most efficient and effective means of removing such products from channels of trade.

For our purposes, recalls fall into two general categories--company initiated recalls and Pesticides Regulation Division initiated recalls. A company initiated recall is one in which the manufacturer takes steps to withdraw the product from the market, without a request from the Pesticides Regulation Division, upon being informed of the Division's findings with respect to a particular shipment. Attachment 1 /See GAO note/ lists thirty instances, primarily in the months of November and December 1967, where companies have voluntarily withdrawn products from the market, or brought outstanding shipments of products into compliance with the Act, following citations. Such recalls have noticeably increased in recent months. We expect this type of voluntary cooperative action on the part of industry to further increase.

A Pesticides Regulation Division initiated recall is one in which the Division specifically requests a manufacturer to withdraw a product from channels of trade. Normally, such a request to a manufacturer would not be made until documentary evidence was available to support strong legal action. In extreme cases, such as a case involving a potentially hazardous product, we would make such a request without the necessary documentary evidence to support legal action.

During the last six months of 1967, four recalls of products were initiated by manufacturers at our request:

1. Wyandotte Chemicals Corporation--Loxene and Loxsit (pentachlorophenol). All salesmen, distributors, and customers of company were directly contacted and 21,450 pounds of Loxene and 9,187 pounds of Loxsit were returned.

2. American Riverside Company, Inc.,--U-MIL-O-IMC (sodium pentachlorophenate). All salesmen, distributors, and customers of company were directly contacted and 385 gallons of this product withdrawn.

3. F. C. Stuartevant Company--Lilly's Ant Cups (sodium arsenate--ant bait packaged in bottle caps). All distributors and dealers of company contacted. Interim report shows that 1,511 dozen returned to company and 14,760 units being held by company for destruction.

4. O. E. Linck Company--Tat-Mo-Go (strychnine sulphate). Recall letters sent to 128 consignees. Interim report shows 469 dozen returned to company. Company inventory of 40,000 packaged units being held for relabeling.

GAO note: Agency attachment not included in this report.

In the above actions, the recalls were supervised by a Supervisory Inspector of the Pesticides Regulation Division. This included supervision of company action in sending recall notices to all consignees or customers, and the reviewing of replies and responses to the recall action. Destruction, relabeling or other disposition of the returned merchandise is also under the supervision of our Supervisory Inspectors. The completeness of the action in the above cases, as in any other recall action, is judged upon the basis of the responses received to the recall notices.

We intend to make increased use of recalls in our enforcement program. It is our intention to initiate a recall action in cases involving products which are hazardous or completely ineffective. It is believed that increased use of the recall procedure is consistent with our enforcement objective of obtaining maximum public protection with the least expenditure of public funds.

In your report it is recommended that procedures be established with respect to obtaining product shipping and location data to assure that pesticide products which represent the greatest health hazard are afforded the necessary depth of coverage. The obtaining of this data would become important if a shipper refused to voluntarily recall a product in a situation where we felt the recall of the product from the market was necessary. In any such case, we would obtain data concerning shipments of the product from the shipper or manufacturer as a first step in obtaining the evidence necessary to support seizure actions. We would use shipping data as a basis for obtaining samples and other documentary information relative to the product at every location possible with a view toward initiating the maximum number of seizure actions.

II. Criminal Procedure

A. Citations

Our citation procedure (notice of contemplated proceedings) is part of the criminal procedures set forth in Section 6 of the Act. This Section provides that whenever economic poisons or devices are found to be in violation of the Act, a notice shall be given to the person against whom criminal proceedings are contemplated. This citation procedure is applicable to all criminal violations of the Act and is a statutory prerequisite to criminal prosecution. The primary purpose of this procedure is to give the person cited an opportunity to submit any facts or explanation relevant to the alleged violation.

Because of the nature and purpose of the citation procedure, we believe it to be our most effective enforcement tool. However, to be effective in accomplishing the purposes of the Act, we also believe it must be utilized as something more than a routine notice of violation--and the person cited must be aware of the true purpose and nature of the citation.

We carefully review the answer to each citation from the standpoint of (1) the nature of the violation, (2) the explanation given by the person cited as to the reason for the alleged violation, and (3) the assurances given that such violation will not recur. These matters are also emphasized in all our meetings and discussions with industry representatives concerning the alleged violation. With the setting up of a section to handle prosecutions, we have emphasized these matters in our citation charge sheets (See Attachment 2). [See GAO note.]

Under Section 6 of the Act we are not required to send to the Department of Justice for prosecution any matter where we make a determination that the public interest will be served by a suitable written notice of warning. We are now specifically calling to the attention of the person cited that our "closing" letter is intended to serve as a notice of warning under Section 6 (See Attachment 3). [See GAO note.]

We believe that through our citation procedure we can most effectively obtain corrective action, not only with respect to the particular product involved, but also with respect to the entire product line of the company cited. For example, we have been informed by companies that as a result of our citations they have taken steps to (1) review all manufacturing procedures to reduce or eliminate contaminations, (2) set up quality controls to assure the effectiveness of their products, and (3) initiate a complete label review for all products. In addition, as noted above, numerous companies have as a result of our citations initiated a recall of violative products.

B. Prosecutions

In your report you indicate that prosecutions under the Act are necessary for a strong enforcement program. We agree. Not only are prosecutions contemplated by the Act, but the enforcement of the Act through criminal prosecutions supports and strengthens our other enforcement activities as well.

In December 1967 a Prosecutions and Imports Section was created in the Pesticides Regulation Division. This Section became sufficiently staffed in January 1968 so that work could be commenced on setting up procedures for the handling of prosecutions. We are currently reviewing all cases in the recent past to determine whether criminal prosecution should be recommended.

On page 19-23 of your report, you refer to numerous alleged violations of the Act on the part of a shipper of disinfectants. We are aware of the past history of this company and a review of all actions relative to this company during the past year became the first order of business of the Prosecutions and Imports Section. A prosecution file relating to this company has been prepared and is currently awaiting review.

GAO note: Agency attachment not included in this report.

The present operating guidelines for the referral of cases for prosecution are that we will forward for prosecution cases where (1) the evidence indicates that the violation was willful, (2) the violation is of a serious nature (e.g., significant deficiency of active ingredient or contamination) and is the result of apparent gross negligence, or (3) the company has engaged in repeated violations.

III. Related Enforcement Activities

During the past year significant changes have been made in our enforcement activities in other areas. Although certain of these areas were not specifically referred to in your report, our enforcement activities in these areas are directly related to the removal of violative products from channels of trade. For this reason, we will refer to them briefly.

A. Imports

It is the responsibility of this Department and the Department of the Treasury to jointly regulate the importation of all economic poisons and devices. Effective regulation of imported pesticides and pesticidal devices is essential if we are to prevent violative imported products from reaching the ultimate consumer. During the past year, we have made a complete review of our import program and have initiated procedures designed to more effectively regulate the importation of pesticides into this country. Attachment 4 [See GAO note.] sets forth our present policy and procedures with respect to imports.

B. Cooperation with States

We believe that the removal of violative products from the market can be more effectively accomplished if close liaison exists between the Department and State regulatory agencies. The Act contemplates that the Department will cooperate with State regulatory agencies in carrying out the provisions of the Act. While close cooperation has existed between the Division and State agencies in the registration of products, there has been no practical or effective cooperative program in the area of enforcement. During the past year, the Pesticides Regulation Division held four regional conferences to which State regulatory officials were invited. One of the primary purposes of these conferences was to discuss enforcement problems with State officials, and to explore the areas in which there could be effective cooperation between the Federal and State agencies.

As a result of our meetings with State officials, we intend during the next fiscal year to make certain recommendations to the States which, if agreeable to any of the State agencies, will, in our opinion, improve the efficiency of Federal--State regulatory activity in the pesticide chemical field. These recommendations will involve (1) the referral by Pesticides Regulation Division to the States of cases involving apparent violations of both the Federal and State acts, but where specific evidence establishing Federal jurisdiction is lacking, (2) the direct referral to our

GAO note: Agency attachment not included in this report.

Supervisory Inspectors of State analytical reports, (3) the establishment of a procedure whereby States are informed of registration cancellations involving potentially hazardous products, and (4) the establishment of a procedure whereby States are informed of recalls initiated by Pesticides Regulation Division.

IV. Legislation

In your report you stated that proposed legislation, if enacted and properly implemented, would achieve generally more effective regulation of pesticides. As you know, legislation of the type referred to in your report was drafted by the Department in 1965 and was transmitted to the Congress in August of that year. The proposed legislation was introduced in Congress in 1965 and again in 1967. It is presently pending in the Congress.

V. Notices of Judgment

You noted in your report that notices of judgment under the Federal Insecticide, Fungicide, and Rodenticide Act had not been published since November 1964 and recommended that procedures involving the frequency of future publications of notices of judgment be established and implemented. You also noted that action to resume the publications has been taken.

Work on a new format for notices of judgment was commenced in June of 1967. To date 100 notices have been prepared. There are presently pending 375 cases which require notices. Due to the limited staff in the Enforcement Branch, it is impossible to state when this backlog will be eliminated. However, it is anticipated that we will be current in our publication of notices by the end of this year. Thereafter, we intend to publish notices of judgment at intervals of not more than six months.

Summary

Our primary enforcement objective under the Federal Insecticide, Fungicide, and Rodenticide Act is to uniformly enforce all the provisions of the Act through all means available to us under the statute. Our yardsticks for measuring enforcement activity are whether such activity is within the framework established by the Congress, and whether the particular enforcement action is best suited to accomplish the purposes of the Act.

It is our belief that the effectiveness of an enforcement program cannot be judged solely upon the basis of numbers, i.e., numbers of citations, seizures, and prosecutions. An effective enforcement program should not be, merely, punitive in nature, but should emphasize corrective action. Its principal aim should be compliance, not punishment.

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Ideally, we should expect an effective enforcement program to reduce violations under the Act. We believe that the best means to accomplish this end are:

1. A strong enforcement program in which we firmly, but fairly, enforce the provisions of the Act. Awareness on the part of industry that the Department can and will monitor industry activities and that strong enforcement action will be taken where warranted, should, by itself, go a long way to achieving compliance with the Act's provisions.

2. Cooperation by industry. We emphasize that industry also has an enforcement responsibility, and that our enforcement program under the Act includes cooperative industry action in any problem area.

Sincerely yours,

R. J. Anderson
Acting Administrator

Enclosures 5 [See GAO note.]

GAO note: Agency enclosures not included in this report.

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THE LAW OF PESTICIDES: PRESENT AND FUTURE

By

Douglass F. Rohrman

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THE LAW OF PESTICIDES: PRESENT AND FUTURE

Douglass F. Rohrman*

I. INTRODUCTION

THE PRIMARY CONCERNS OF MAN have always been survival and improvement of his condition. As population and social organization increased, there has developed greater ability to manipulate and control the environment. In the process, damage has been inflicted upon man and his surroundings. Advances in environmental control have often entailed a certain degree of risk which society has been forced to weigh and either accept, alter or reject.

One of civilization's major steps toward controlling the environment has been the domestication of food plants. Beginning in the early eighteenth century, new scientific discoveries made possible a more increased agricultural production. Land area for agricultural use increased vastly. Higher crop yields resulted from the innovation of crop rotation principles and the development of better soil management practices. Consequently, growth in food production and supply has contributed significantly to the population explosion of the last two hundred years.

A more subtle and far more recent historical development has been the concern over man's health and safety. It has been gradually realized that the future welfare of the human race depends upon vigorous programs to safeguard health while maintaining a more intensified agricultural output. With improved agricultural organization and resultant crop abundance, the natural eventuality was an increased problem with pests. Even a casual observation of world history reveals many references to pestilence and plague; indeed, the course of civilization's development has been markedly changed by these problems. As a result of pests, man has had to cope with disease, discomfort and significant economic loss.[1] Pest control has been and

* A.B., Duke University, 1963; J.D., Northwestern University, 1966. Formerly a Legal Coordinator, Pesticides Program, Food and Drug Administration, Consumer Protection and Environmental Health Service, United States Department of Health, Education and Welfare (1966-68).

1. *See* H. ZINSSER, RATS, LICE AND HISTORY (1935); Horsfall, *A Socio-Economic Evaluation*, in RESEARCH IN PESTICIDES 3 (1965); Metcalf, *How Many Insects Are There in the World?*, 51 ENT. NEWS 219 (1940); Sabrosky, *How Many Insects Are There?*, 1952 THE YEARBOOK OF AGRICULTURE 161; United States Dep't of Agriculture, *Protecting Our Food*, 1966 THE YEARBOOK OF AGRICULTURE 1.

will continue to be a very real necessity.[2] This, in turn, makes obvious the need for pesticides.[3] "Pesticides have made a great impact [on society in the United States] by facilitating the production and protection of food, feed, and fiber in greater quantity and quality; by improving health; and by keeping in check many kinds of nuisance insects and unwanted plants."[4] Pesticides, at least for the present, have also made pest control a financially feasible activity, one which does not have to compete with other critical economic demands.[5] Rapid population growth and the resulting decrease in land available for agriculture necessitate greater crop yield per acre and reduction of losses and spoilage in stored foods. Even in a country with agricultural surpluses, one cannot ignore the contribution which insecticides and herbicides have made to increasing the food supply. If insect control, coupled with other factors, did not make it possible for farmers to produce food at a higher rate, we would simply require more agricultural workers and more cultivated land or face starvation. Pesticides also have become integral in other phases of the economy, since many commodities must be protected from insects and other pests during the manufacturing process and subsequent distribution.[6]

Qualifying the virtues of pesticides, however, is the increasingly ample evidence of environmental contamination by chemical residues. During the two decades of intensive advancement in this field, significant amounts of

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2. A. MALLIS, HANDBOOK OF PEST CONTROL (1964); Lylel, *Can Insects Be Eradicated?*, 1952 THE YEARBOOK OF AGRICULTURE 197; Pratt & Litig, Insecticides for the Control of Insects of Public Health Importance, United States Dep't of Health, Educ. & Welfare Training Guide (1967). Only in the past century has there been a scientific approach in the control of pests. In 1888, the Department of Agriculture imported the ladybird beetle from Australia to control the cottony cushion scale in citrus orchards. Since that time, pest control activities have grown to tremendous capacities. *See* note 11, *infra*. For an excellent overall view, *see* NATIONAL ACAD. SCI., SCIENTIFIC ASPECTS OF PEST CONTROL (1966).

3. The dramatic effectiveness of new pesticides has somewhat overshadowed the continuing efforts toward non-chemical pest control. For a short study of insect control by way of other insects, *see* Burks, *Insects, Enemies of Insects*, 1952 THE YEARBOOK OF AGRICULTURE 373. For insect resistant crops, *see* PAINTER, INSECT RESISTANCE IN CROP PLANTS (1951); Packard & Martin, *Resistant Crops the Ideal Way*, 1952 THE YEARBOOK OF AGRICULTURE 429; Snelling, *Resistance of Plants to Insect Attack*, 7 BOT. REV. 543 (1941). Research is being conducted presently in the effects of parasites, insect diseases, predators, ecology and physical forces (*e.g.*, gamma rays, radiant energy, high frequency sound) on insects. Other studies have included attractants and chemical communication as "bait" for insect traps. *See also* Sailer, *Revival in Biological Control*, 22 AG. CHEM. 5 (1967); Wilson, *Pheromones*, SCIENTIFIC AMERICAN, May, 1963, at 100.

4. REPORT OF THE PRESIDENT'S SCIENCE ADVISORY COMMITTEE, USE OF PESTICIDES 2 (1963).

5. *Id.* at 3.

6. *Id.*

pesticides have been dispersed. Pesticides are detectable in man and animals, food, feed, clothing and natural surroundings. Although these compounds persist usually in small quantities, their toxicity, variety and persistence may eventually affect human health. Crops of all types are treated which formerly were left unprotected. Expanding suburbs have accounted for some of the increased use of pesticides by homeowners on lawns and gardens and in dwellings. Termite and structural pest control have become lucrative and expanding enterprises.

While the consequences of acute exposure are obvious, some of the more subtle risks must still be evaluated.[7] "Precisely because pesticide chemicals are designed to kill or metabolically upset some living target organism, they are potentially dangerous to other living organisms."[8] Some pesticides are highly toxic in concentrated amounts, and in unfortunate instances they have caused illness and death of people and animals. Although acute human poisoning is a measurable and significant hazard, it is relatively easy to identify and control when compared to potential, low-level chronic toxicity which has been observed in the laboratory.[9] In both chronic and acute cases, human toxicity is often difficult to determine. The hazard or danger presented by a certain compound can be measured only in relation to practical conditions, although it can be predicted, to a limited extent, from its toxicity or inherent ability to injure living organisms. Conversely, toxicity may be guessed from results or accidents but not accurately without a known dosage.

Along with the need for these many compounds, therefore, are concomitant hazards, both direct and indirect. The presence of any foreign chemical in air, water or food is not a matter to be dismissed lightly. The problem of pesticide poisoning faces us all. Inevitably, as population and its related necessities grow, so do these hazards if neglected or left unchecked.

II. Statutory Regulation of Pesticides

This leads to a consideration of the means by which society in the United States has attempted to alleviate these potential health and agricultural problems. It has been man's experience that leaving control of dangers to individuals or group self-help, while often practical and beneficial, generally does not accomplish anything more than momentary success. Ideally,

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7. *Id.*

8. *Id.*

9. *Id.* Of recent interest are the discoveries which indicate that pesticides interact with other compounds to create more poisonous "synergistic" effects. *See* Durham, *The Interaction of Pesticides with Other Factors*, 18 Residue Rev. 21 (1967).

regulations and laws set permanent standards that perpetuate the control which self-help accomplishes only in a sporadic fashion. The law, philosophically and practically, is a type of guaranty to keep man from harming, misusing or destroying himself, his property, another person or another's property. To support this guaranty, the law has generally developed a system of remedies, many of which spring from statutory proscriptions, applicable to a variety of injuries and legal wrongs. With this in mind, part of the justification for enactment of pesticide laws can be based upon the need to provide this statutory guaranty to individuals and society and to make available standardized remedies for injuries due to use, both wrongful and incidental, of these compounds.

Legal control over the use of pesticides has been both indirect and direct. Indirect control is maintained by federal and state registration or "labeling" laws and by regulations setting tolerances for residues on agricultural commodities. Direct control is accomplished by means of use and application laws, such as applicator's licensing statutes. Often, additional direct control may exist by way of specific regulations prohibiting the use of particular pesticides in certain situations. Historically, outright prohibition of the sale or use of a compound has met with opposition and such control generally has been moderated. Views on pesticides range all the way from the assertion that their use should be altogether barred or minutely regulated to the contention that their advantages so greatly overshadow the disadvantages that little or no regulation is necessary. Generally, a middle ground position has been the basis of statutory reasoning, mitigating to a large extent both extremes. Limitations on who can use a material or how it can be used rather than on the freedom to use it at all have been applied in most cases except those involving the most dangerous of compounds and methods.

A. Federal Pesticide Laws

In 1910, in order to protect consumers from substandard or fraudulent products, Congress passed the Federal Insecticide Act.[10] This legislation was

10. Act of April 26, 1910, 36 Stat. 331, 7 U.S.C. §§ 121-34. Passed on April 26, 1910, the original Federal Insecticide Act was entitled "An Act for Preventing the Manufacture, Sale or Transportation of Adulterated or Misbranded Paris Greens, Lead Arsenates, and Other Insecticides and Also Fungicides, and For Regulating Traffic Therein, and For Other Purposes." It was repealed by force of Act of June 25, 1947, 61 Stat. 172. For an example of the administration of the old Act, *see* United States v. Sani-Pine Corp., 153 F.2d 1015 (2d Cir. 1946); Parke, Davis & Co. v. United States, 255 F. 933 (5th Cir. 1919); United States v. Powers-Weightman-Rosengarten Co., 211 F. 169 (S.D.N.Y. 1913); United States v. 681 Cases, More or Less, Containing "Kitchen Klenzer," 63 F. Supp. 286 (E.D. Mo. 1945). "Although in a few states, insecticide laws regulating the sale of paris green and lead arsenate were in effect prior to 1910, a number of other states by 1915 passed laws similar in many respects to the Federal Law." H. Shepard, The Chemistry and Action of Insecticides 7 (1951).

the only step the federal government took to regulate pesticide sale and use for some thirty-seven years. The reasons for this delay are made more obvious after an examination of economic history. Neither the domestic demand for new and additional types of potentially harmful pesticides nor technological development had reached a level to merit additional legislation.[11] During World War II, large scale tests were run in a number of areas to control insect pests. The knowledge gained from this work and increased industrial capacity led to original and startling developments in the field of synthetic pesticide manufacture.[12] Until the post-World War II era, however, there was no apparent need for pesticide legislation other than the

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11. "From 1910 until World War II, the pesticide evolution in the chemical age was a very slow and deliberate process. New means of controlling insects did not appear frequently and even new fungicides were hard for research specialists to find." Ward, *A Dynamic Statute for Pesticides*, 1966 THE YEARBOOK OF AGRICULTURE 271. Prior to World War II, the manufacture of pesticides consisted largely of inorganic products such as calcium arsenate, lead arsenate, paris green, copper sulfate, fluorine compounds and ground sulfur, along with botanical insecticides -pyrethrum dust and extract, rotenone dust and nicotine sulfate. Since the advent of DDT, there has been a trend toward organic compounds. Each year many new pesticides enter the market. One advantage in the increased manufacture of synthetic organic pesticides lies in the domestic availability of basic materials needed for their production. The United States is dependent to some extent on imports of arsenic and lead (for lead arsenate). Supplies of pyrethrum and rotenone are entirely of foreign origin. The Census of Manufacturers valued 1939 production of all pesticides at $75 million. According to the United States Tariff Commission, sales of synthetic organic pesticides alone totaled $150 million in 1951, $133 million in 1952, $118 million in 1953, $124 million in 1954 and reached $302,955,000 in 1961 and $346,441,000 in 1962. These figures do not include other pesticides, which amounted to $160 million in 1953, $175 million in 1954 and over $190 million in 1955. *See* ARRINGTON, WORLD SURVEY OF PEST CONTROL PRODUCTS 1-2 (1956). The same work is valuable for coverage of world pesticide production. Manufacturers' dollar sales of synthetic organic pesticides rose 90 per cent from 1960 to 1965 and the value of all pesticides (domestic and export) rose 46 per cent from 1960 to 1964. United States production of organophosphorus insecticides as a class rose 18 per cent in 1965 over the year before. Calcium arsenate and lead arsenate have by no means disappeared from the market; 140 million pounds of DDT as well were produced in 1965. In 1963 there were twenty-one separate companies which produced basic pesticides, nine of which were considered to have 90 per cent specialization. These twenty-one companies employed 2,714 employees with a gross payroll of $20,256,000; 3,432,000 man hours were employed in producing $187,503,000 worth of basic pesticides, many of which are mixed and compounded into numerous other formulations. New capital expenditures in 1963 for these companies were $13,269,000. 1963 INDEX OF MANUFACTURERS. *See Hearings on S. Res. 27 Before the Subcomm. on Reorganization and International Organizations of the Senate Comm. on Governmental Operations*, 88th Cong., 1st Sess., pt. 1, at 8-32 (1963), for an excellent summary of pesticide production. *See also* D. FREAR, PESTICIDE HANDBOOK-ENTOMA (19th ed. 1967); Howard, *Production and Distribution of Pesticides*, in OCCUPATIONAL HEALTH ASPECTS OF PESTICIDES 1-9 (1964); Wellinan, *Industry's Rate in the Development of Pesticides*, in SCIENTIFIC ASPECTS OF PEST CONTROL 355 (1966).

12. *See* Knipling, *The Control of Insects Affecting Man*, 1952 THE YEARBOOK OF AGRICULTURE 486.

somewhat limited coverage of the 1910 Act simply because domestic pesticide production was still on a relatively small scale.

Following the war, agricultural development and pesticide technology reached such a level that legislators recognized the need for additional protection of the consumer and the general public. The use of pesticides increased not only in volume but also in variety and application technique. The employment of specialized products for specific controls became more general.[13] Prompted by these facts, Congress, in 1947, passed the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).[14]

The FIFRA completely supersedes the 1910 legislation. It is designed as a regulatory measure.[15] Any product which can be termed an "economic poison" and classed as an insecticide, fungicide or rodenticide must be registered with the Department of Agriculture before it may be marketed in interstate commerce.[16] While "economic poison" as used in the Act has been popularly redefined to mean "pesticide," the law defines an "economic poison" as:

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13. For a short, but informative picture of trends in pesticide production, *see* D. FREAR, *supra* note 11, at 27-29. For a list of pesticide manufacturers and their products, *see Id.* at 59-299 and 300-14.

14. 61 Stat. 163, 7 U.S.C. §§ 121-35 (1964). The House Committee on Agriculture concluded before passage of this Act that "since 1910 great changes have occurred in the field of economic poisons and the present law is not inadequate." 1947 U.S.C. CONG. SERV. 1200. *See also* Anderson, *Official Registration of Pesticides*, in SCIENTIFIC ASPECTS OF PEST CONTROL 385 (1966); Harris & Cummings, *Enforcement of the Federal Insecticide, Fungicide and Rodenticide Act in the United States*, 6 RESIDUE REV. 104 (1964); Reed, *The Federal Act of 1947*, 1952 THE YEARBOOK OF AGRICULTURE 310; Ward, *The Functions of the Federal Insecticide, Fungicide and Rodenticide Act*, 55 AM. J. PUB. HEALTH 7 (1965).

15. "It should be emphasized that the basic purpose of this law is protection of the general public from personal and economic injury, including not only the purchases of products subject to the Act but all individuals who may come into contact with them or materials which may have been treated with them." Harris & Cummings, *supra* note 14, at 106.

16. *See* 7 U.S.C. § 135b (1964). Registration is good for five years and is renewable. 7 U.S.C. § 135b(f) (1964) and 7 C.F.R. § 362.10 (1968). The registration process takes around four to six weeks from the time of original submission providing supportive data is adequate. 7 U.S.C. § 135b(a) states that an economic poison "distributed, sold, or offered for sale in any Territory or the District of Columbia, or which is shipped or delivered for shipment from any State, Territory, or the District of Columbia, or which is received from any foreign country shall be registered with the Secretary . . . ." This clause sets up the relevant commercial transactions to which FIFRA applies, which are, generally speaking, interstate in nature. It should be stressed that exports are not subject to this Act. *See* 7 U.S.C. § 135a(b) (1964) and 7 C.F.R. § 362.31 (1968). While "economic poison" is defined in FIFRA, a more complete definition is found in 7 C.F.R. §§ 362.2(c), 362.101 (1968). It should also be understood that professional applicators carrying economic poisons across state lines are not subject to the act. 7 C.F.R. § 362.100 (1968).

> (1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any insects, rodents, nematodes, fungi, weeds, and other forms of plant or animal life or viruses, except viruses on or in living man or other animals, which the Secretary shall declare to be a pest, and (2) any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant.[17]

The Pesticides Regulation Division of the Department of Agriculture requires statements from the manufacturer on the composition of the product, the names of the crops on which the product is to be used and the specific conditions under which it is to be applied.[18] Applications for registration are reviewed by the Food and Drug Administration, the Public Health Service and the Department of the Interior and are usually granted if these prerequisites are met, if the proposal meets the standards of good agricultural practice and if the use of the product does not constitute a danger to wildlife or create a public health hazard. Any manufacturer, seller, shipper or distributor may register a substance under the Act, but the shipper is primarily responsible for compliance.[19] The shipper, however, may exempt himself from primary compliance requirements by way of specific guaranties found in the Act.[20]

The FIFRA provides for seizures in cases where pesticides are adulterated, misbranded, unregistered or insufficiently labeled or when devices are misbranded.[21] Other means of enforcement within the Act are criminal fines

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17. 7 U.S.C. § 135(a) (1964).

18. Labeling language to be used is set out in 7 C.F.R. §§ 362.104, 362.5, 362.6 (1968); labels for large containers are governed by 7 C.F.R. §§ 362.6, 362.108 (1968). Ingredient statements must follow the regulations under 7 C.F.R. §§ 362.7, 362.103 (1968). Advertising policies are found in 7 C.F.R. § 362.107 (1968). More complicated and precise statements are necessary for those pesticides considered highly toxic to man, 7 C.F.R. § 362.8 (1968). For interpretations concerning statement of net contents, *see* 7 C.F.R. § 362.104 (1968). Warning or caution statements are covered in 7 C.F.R. §§ 362.9, 362.116 (1968). Details concerning registration are found in 7 C.F.R. § 362.10 (1968). Interpretations concerning directions for use are found in 7 C.F.R. § 362.105 (1968). For a case involving improper labeling, *see* Wise v. Hayes, 58 Wash. 2d 106, 361 P.2d 171 (1961). The Pesticide Control Act of 1967, or Senate Bill 2057 (1967), now in committee, would require registration of pesticide manufacturers, formulators, etc., coupled with appropriate regulations designed to insure safety in these establishments. 7 C.F.R. § 362.122 (1968) is an important section to consider when dealing with safety claims and claims of non-toxicity. See note 47, *infra*, for interdepartmental agreement on registrations.

19. The section on prohibited acts, 7 U.S.C. § 135a (1964), deals with the shipping of goods.

20. *See* 7 U.S.C. § 135e (1964) and 7 C.F.R. § 362.11 (1968).

21. 7 U.S.C. § 135g (1964). This section sanctions seizures for confiscation by a process of

and prison terms.[22] All manufacturers, distributors, dealers and carriers who deal in these materials are required to keep accurate books and records.[23]

Information required on the label constitutes, as a practical matter, one of the most important considerations for the manufacturer of pesticides. No

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libel for condemnation in cases where an economic poison is (a) adulterated or misbranded, (b) not registered pursuant to 7 U.S.C. § 135b (1964), (c) improperly labeled under 7 U.S.C. §§ 135-135k (1964), (d) a white powder not properly colored under the same sections, or (e) in situations where a device is misbranded. Precise delineations of "adulteration" and "misbranding" are found in 7 C.F.R. §§ 362.13, 362.14 (1968). "Coloration" is covered by 7 C.F.R. § 362.12 (1968). After analysis of a pesticide and a finding of irregularities, a report is made to the Department of Justice which instructs a federal marshal to seize the compound. Thereupon, the substances become the property of the United States Government. From this generally one of four things happens: (a) the owner of the seized pesticide agrees to condemnation by consent, a decree is issued to that effect and appropriate action subsequently will be arranged (usually destruction); (b) often, when goods are abandoned and no action is taken by the owner, the Government simply destroys them; (c) the owner files a claim and brings an appropriate action in the proper Federal District Court to oppose the libel of condemnation; or, (d) the pesticides can be reclaimed and reconditioned to meet FIFRA standards by consent to which both parties agree (often this involves a mere word change on the label or, in rarer cases, a complete reprocessing of the chemicals). Procedures under FIFRA are much the same as under the Federal Food, Drug and Cosmetic Act (FDCA), 21 U.S.C. §§ 301-92 (1964), except the latter deals with condemnation of contaminated raw agricultural commodities which rarely can be reconditioned. Under § 346 of the FDCA, when a tolerance is violated, the food is considered "unsafe" within the meaning of § 342(a) dealing with adulterated food. Adulterated food is subject to seizure under § 334 and ultimate destruction under § 334(d). For a case involving remilling of rice which had a high lindane residue in violation of the FDCA, see Orkin Exterminating Co. v. Gulf Coast Rice Mills, 343 S.W.2d 768 (Tex. Civ. App. 1961). *See also* Victrylite Candle Co. v. Brannan, 201 F.2d 206 (D.C. Cir. 1952), *cert. denied*, 345 U.S. 975 (1953) (seizure of mosquito candles); Hoy, *Food Seizure Litigation*, 9 AM. JUR. TRIALS 59 (1965).

22. 7 U.S.C. § 135f (1964). This section, amended in 1964, by Act of May 12, 1964, Pub. L.No. 88-305, 78 Stat. 190, deleted certain provisions of FIFRA. As it stands now, any person violating 7 U.S.C. § 135(a)(1) (1964) (which deals with registration and misleading claims) is guilty of a misdemeanor and is subject to a fine of not more than $1,000. Persons violating any provision other than § 135a(a)(1), [*i.e.*, those who violate labeling provisions, special marking provisions, adulteration and misbranding sections, coloring provisions; or those who alter, deface, detach or destroy a label; or refuse to supply the Secretary with certain information or give false guaranty as defined in 7 C.F.R. §§ 362.11, 362.109 (1968); or wrongful revealing of formulas] may be subject to a misdemeanor fine of $500 for the first offense and a fine of not more than $1,000 or one year imprisonment for each subsequent offense. An offense five years after a prior conviction is deemed to be a first offense. Enforcement procedures are set out in 7 C.F.R. § 362.15 (1968).

23. 7 U.S.C. § 135c (1964). Under this section any duly authorized employee of the federal, state or local authorities must have reasonable access to and right to copy the books and records of any person relevantly delineated under this section. The evidence obtained under this section, however, cannot be used in a criminal prosecution. *See* United States v. Weinreb, 99 F. Supp. 763 (S.D.N.Y. 1951).

name or statement on the label of an economic poison may be false or misleading with respect to usefulness, composition and other material factors.[24] Warning and caution statements are set out in detail.[25] Ingredient statements must meet the standards of good manufacturing practice and accuracy.[26] Statements of net contents must appear prominently on the label.[27] Directions for use must appear on all containers.[28]

Classification of pesticide toxicity leads to other labeling complications. Four basic classes of economic poisons are delineated under the FIFRA. First, there are those considered highly toxic to man; such compounds are subject to special labeling regulations.[29] Somewhat less toxic compounds are subject to lesser requirements because their toxicity is generally one-tenth that of the first class.[30] The third class, which still requires caution on the part of the user, is considered one-tenth as potent as the second class.[31] Finally, the fourth class is considered safe and requires no precautionary statements.[32] All warning statements are required to be concise and easily understood.

In 1959, with industrial production and innovation at a peak, Congress passed the Nematocide, Plant Regulator, Defoliant and Desiccant Amendment.[33] The FIFRA thereby was extended to those materials named

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24. 7 U.S.C. § 135(2) (1964) defines such activity as "misbranding." *See* 7 C.F.R. § 362.14 (1968). It is well to note that a name registered with the United States Patent Office, if not fradulent, will generally comply with FIFRA standards. Accepted names are found in R. CASWELL, ACCEPTABLE COMMON NAMES AND CHEMICAL NAMES FOR THE INGREDIENT STATEMENT ON ECONOMIC POISON (PESTICIDE AND PLANT GROWTH REGULATORS) LABELS (1967). For further information see Harris & Cummings, *supra* note 14, at 108-11 and 7 C.F.R. § 362.104 (1968). The Federal Trade Commission recently proposed new rules concerning the advertising of economic poisons. Such rules would coincide with FIFRA and make false or misleading advertising an unfair trade practice. Rule of January 24, 1968. *See also* FTC v. Woodbury Chemical Co., no. C-1035, (Jan. 20, 1966), which attacked inconsistencies between advertising and proscribed USDA labels for 10 per cent parathion granules.

25. 7 C.F.R. § 362.116 (1968); *see* McClanahan v. California Spray-Chem. Corp., 194 Va. 832, 75 S.E.2d 712 (1953).

26. 7 C.F.R. § 362.103 (1968).

27. 7 C.F.R. §§ 362.104, 362.6(e) (1968). This interpretation, issued in February, 1965, is an obvious precursor of today's fair packaging legislation and the recent attention being given to protection of the consumer in the area of weights and measures. Purity of economic poisons and the violation of such standards (adulteration) are discussed in 7 C.F.R. § 362.13 (1968).

28. 7 U.S.C. § 135(z)(2)(c) (1964); 7 C.F.R. § 362.105 (1968).

29. *See* 7 U.S.C. § 135a(3), 7 C.F.R. §§ 362.103(a)(2), 362.116(b)(2)(i), (1968). For a case involving the death of two workers from inadequately labeled parathion, *see* Hubbard-Hall Chemical Co. v. Silverman, 340 F.2d 402 (1st Cir. 1965).

30. 7 C.F.R. § 362.116(b)(2)(ii) (1968).

31. 7 C.F.R. § 362.116(b)(2)(iii) (1968).

32. 7 C.F.R. § 362.116(b)(2)(iv) (1968).

33. 7 U.S.C. § 135 (1964). Further, in 1962, the regulations were changed to include an

in the amendment, and registration requirements were also applied to them.

In 1964, Public Law 88-305 was added.[34] This amendment eliminated the controversial "registration under protest" section which allowed the sale of an unregisterable product when a protest was duly filed. The Secretary of Agriculture at the same time was authorized to require pesticide labels to bear a federal registration number.[35] Simultaneously, the FIFRA was revised to require conspicuous labeling of poisonous and potentially hazardous pesticides.[36] Manufacturers were also required to remove unwarranted safety claims from the labels.[37]

In addition to the FIFRA, its amendments and regulations, the Federal Food, Drug and Cosmetic Act of 1938[38] places limitations on pesticide residues in foods where these materials are necessary for the production of a food supply. All pesticides must have either a stipulated tolerance or an exemption which recognizes them as safe. Extensive hearings have been held over a period of years in an attempt to establish such tolerances; however, because of unclear procedural guidelines, divergent points of view and the ever-changing methodology in the pesticide industry, a significant amount of work has never produced a truly complete set of standards.[39]

The so-called Miller Amendment to the Food, Drug and Cosmetic Act was passed in 1954.[40] This amendment provides that any raw agricultural commodity may be condemned as adulterated if it contains a residue of any pesticide chemical which has not been formally exempted as safe or which is

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expanded definition of "pest" to bring under regulation more materials used in repelling birds, reptiles, predatory animals, certain fish, plant diseases and weeds. This redefinition brought under USDA surveillance about 2,000 more products put out by some 800 firms. Anderson, *Official Registration of Pesticides*, in SCIENTIFIC ASPECTS OF PEST CONTROL 385 (1966).

34. Pub. L. No. 88-305, § 7 (May 12, 1964), deleted the protest section in 7 U.S.C. § 135b (1964). *See Hearings on S. Res. 27*, *supra* note 11, pt. 1, at 96-97 (1963), for list of pesticides that had been registered under protest.

35. Pub. L. No. 88-305, § 1 (May 12, 1964), added to 7 U.S.C. § 135(2)(b) (1964), the words "other than the registration number assigned to the economic poison" which revised the misbranding regulations.

36. 7 C.F.R. § 362.9 (1968).

37. 7 C.F.R. § 362.122 (1968).

38. 21 U.S.C. §§ 301-92 (1964). For an older article, see Dunbar, *Insecticides and the Pure Food Law*, 1952 THE YEARBOOK OF AGRICULTURE 314.

39. For the tolerances and exemptions from tolerances for pesticides on or in raw agricultural commodities, *see* 21 C.F.R. § 120 (1968). The basis for these regulations is 21 U.S.C. § 346 (1964). *See also* United States v. Bodine Produce Co., 206 F. Supp. 201 (D. Ariz. 1962) (DDT tolerance on lettuce); Atlas Powder Co. v. Ewing, 201 F.2d 347 (3d Cir. 1952), *cert. denied*, 345 U.S. 923 (1953).

40. Pub. L. No. 87-791 (August 28, 1958), *amending* 21 U.S.C. § 346a (1964).

present in excessive amounts.[41] It gives the Secretary of Health, Education and Welfare the power, previously handled unsuccessfully by hearings, to establish residue tolerances and provides in detail the procedure to be followed.[42] The manufacturer, for example, must submit information (which is kept confidential) on the chemical identity of the compound; its toxicity to laboratory animals; the amount, frequency and time of application to the specific crop or crops covered; data to indicate the magnitude of residues remaining following the recommended application; and finally, the tolerance requested with supporting data.[43] The Department of Agriculture then must certify that the chemical is useful for the production of the crop or control of the pest in question.[44] The tolerance proposed by the petitioner must reflect the amount of residue likely to result when the pesticide is used in the manner proposed.[45] On the other hand, exemptions from tolerances can be granted when no hazard to human health is exhibited by the use of a certain quantity

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41. 21 U.S.C. § 342 (1964) refers to adulterated food; 21 U.S.C. § 342(a)(2)(B) (1964), refers, in turn, to the prohibited acts section, 21 U.S.C. § 346a (1968). *See also* Porter & Fahey, *Residues on Fruits and Vegetables*, 1952 THE YEARBOOK OF AGRICULTURE 297. Pesticide Chem. Reg. § 23, 20 Fed. Reg. 1473 (1955), explains tolerances on vegetables. Foods, it is generally agreed, may be adulterated regardless of whether they are, in specific cases, injurious to health when a tolerance has been set. If there is no tolerance, then the government must prove a possibility of injury to human health under the statute. *See* United States v. Bodine, 206 F. Supp. 201 (D. Ariz. 1962). "Raw agricultural commodities" is defined in 21 C.F.R. § 120.1(e) (1968). *See also* Durham, *Pesticide Residues in Foods in Relation to Public Health*, 4 RESIDUE REV. 33 (1963).

42. 21 U.S.C. § 346a(d) (1964). Such tolerances are subject to the prerequisite of shipment in interstate commerce and the government, in the case of adulteration of a raw agricultural commodity, has the burden of proof that the goods were adulterated at the threshold of or during interstate commerce. Pasadena Research Laboratories, Inc. v. United States, 169 F.2d 375 (9th Cir.), *cert. denied*, 335 U.S. 853 (1948). *See also* the regulations concerning tolerances, 21 C.F.R. § 120 (1968).

43. 21 U.S.C. § 346a(d) (1964). Data submitted in accordance with this section is guaranteed confidentiality as stated in 21 U.S.C. § 346a(f) (1964). *See* Roark, *How Insecticides Are Developed*, 1952 THE YEARBOOK OF AGRICULTURE 202.

44. 21 U.S.C. § 346a(b)(3) (1964); 21 C.F.R. § 120.4 (1968); 7 C.F.R. § 363 (1968). Testing and analysis of economic poisons under FIFRA is governed by 7 C.F.R. § 362.110 (1968).

45. *See* 21 U.S.C. § 346a(b)(3) (1964); 21 C.F.R. § 120.4 (1968); 7 C.F.R. § 363 (1968). In some instances, because of the characteristics of the pesticide, the way it is likely to be used or because no studies have been made of the compound, a zero tolerance (no residue allowable) has been set. Zero tolerances have come to be quite controversial and there is an indication that they may be deleted in favor of finite tolerances of a minimal nature. 21 C.F.R. § 120.5 (1968). In setting tolerances, a safety factor of 100 is taken into account. *See Hearings on S. Res. 27*, *supra* note 11, pt. 7, at 1319-34 (1963), for an account of Dow Chemical Company's experiments evaluating the safety of a pesticide chemical. *See also* D. FREAR, *supra* note 11, at 33-57, for a comprehensive list of tolerances.

of pesticide on or in a certain commodity.[46] Thus far, there have been no reported cases of illness or death in the United States from pesticide residues on food when formulations have been used according to label directions. However, there have been several instances in which inordinant amounts of pesticides have contaminated food, thus leading to significant epidemiological problems.

The FIFRA and the Food, Drug and Cosmetic Act, supplement each other and are interrelated by law and in practical operation.[47] In most cases, an interpretation of one will apply with equal force to the other. It has been the policy of the Department of Agriculture not to register any new pesticide unless either a tolerance has been established for it under the Miller Amendment, it has been exempted under that section or it has been shown adequately that no residues will result from the proposed use of the product. The zero tolerance concept, however, has given way to outright denial of registration for those pesticides considered highly toxic to man and animals. Conversely, a tolerance will normally not be granted by the Department of Health, Education and Welfare until an application for registration has been filed with the Department of Agriculture. Most manufacturers file application for registration and at the same time petition for a tolerance or an exemption from tolerance specification, so that the two applications may be processed simultaneously.[48]

An additional federal act which has an indirect bearing on this general field of law is the Williams Bill, passed in 1958.[49] It regulates the additives in processed foods and covers any material "intentionally" or "incidentally" added to foods. Pesticides added to foods might be covered by this section,

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46. See 21 C.F.R. §§ 120.1001-.1018 (1968) for exemptions. These exemptions are only for pre-harvest applications. See 21 C.F.R. § 121.2 (1968) for tolerances in processed foods.

47. It is well to note that since 1964 a three-way agreement has existed between the Departments of Agriculture; Health, Education and Welfare; and the Interior providing for coordination in the review of pesticide registration applications. In addition, the Federal Committee on Pest Control (FCPC) coordinates federal pest control activities to see that the total public interest is served in terms of safety and effectiveness. *See* FCPC, WHAT IT IS, WHAT IT DOES (1967) [U. S. Government Pamphlet 0-250-459 (30)]; *Hearings on S. Res. 288 Before the Subcomm. On Reorganization and International Organizations of the Senate Comm. on Governmental Operations*, 88th Cong., 2d Sess., app. III & IV to pt. 1 (1964); Anderson, *The Federal Committee on Pest Control*, in SCIENTIFIC ASPECTS OF PEST CONTROL 367 (1966). *See also* 32 Fed. Reg. 13202 (1967) for outline of FCPC functions and procedures.

48. Registration is specifically covered in FIFRA under 7 U.S.C. § 135b (1964) and in the regulation under 7 C.F.R. § 362.10 (1968); petition for a tolerance or for an exemption is covered in 21 C.F.R. § 120.7 (1968). Other detailed provisions for review of tolerances are found in 21 C.F.R. § 120.8 (1968).

49. *See* 21 U.S.C. § 348 (1968).

such as fumigants used to retard insect contamination during storage or shipment. Normally, however, an example of an intentional additive would be the emulsifier added to ice cream; incidental additives would include liners or casing for packages which might dissolve in a food or beverage.[50] As a matter of current interest, the so-called "Delaney Clause" in the Food, Drug and Cosmetic Act stipulates that no material which is capable of causing cancer under any condition may be permitted in any food.[51] This again only skirts the field of pesticide laws but has generated a great deal of controversy.[52]

From time to time, new regulations and interpretations are promulgated under the authority of the FIFRA to facilitate effective coverage of that area duly delegated to the Department of Agriculture.[53] In addition, the Department of Agriculture sets up guidelines which, while lacking the force of law, delineate matters of policy.[54] Food and Drug Administration tolerances have fluctuated often with the expanding variety of uses developed for old compounds and the constantly increasing flow of new products and formulations employed in agriculture and pest control. Therefore, new tolerances are being issued constantly; these changes and additions demand almost day to day scrutiny by those responsible for compliance.

B. State Pesticide Legislation

Generally, there are two types of state pesticide laws. First, registration statutes specify certain controls over the distribution and sale of pesticides in intrastate commerce. In addition, some states have set up pesticide tolerances for agricultural commodities sold within the particular jurisdiction. Secondly, there are a group of laws considered peculiar to the states, which regulate within the state the use and application of the substances themselves.

The laws dealing with registration were generally modeled after the

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50. D. FREAR, *supra* note 11, at 32. *See* 21 C.F.R. §§ 121.2-.8 (1968) (pesticides as food additives) and 21 C.F.R. § 121.102 (1968) (adjuvant exemptions).

51. 21 U.S.C. § 348(c)(3)(A) (1964).

52. There is a great diversity of opinion as to carcinogenicity of some pesticides. For a discussion of this problem see *Hearings on S. Res. 27*, *supra* note 11, pt. 3, at 673-716 (1963).

53. 7 U.S.C. § 135d (1964), empowers the Secretary of Agriculture to make rules and regulations. FIFRA regulations can be found in 7 C.F.R. § 362 (1968) and USDA interpretations are found in 7 C.F.R. §§ 362.100-.122 (1968).

54. Guidelines are often supplements to interpretations and rules and are informational in character, providing recommendations as to the use, sale and shipment of pesticides. *See* U.S. DEP'T OF AGRICULTURE, GUIDE FOR THE USE OF INSECTICIDES (1967); U.S. DEP'T OF AGRICULTURE, SAFE USE OF AGRICULTURAL AND HOUSEHOLD PESTICIDES (1967). A recent USDA guideline against warranty disclaimers is strengthened by Udell v. Rohm and Haas Co., 64 Wash. 2d 441, 392 P.2d 225 (1964).

FIFRA by way of the Council of State Governments' so-called "Uniform State Pesticide Act." Some state registration legislation automatically exempts those products which bear the federal registration number and appropriate labeling. However, those products marketed solely in intrastate commerce will ordinarily have to be registered with the appropriate state official. Labeling requirements under state statutes are generally less stringent than those dictated by the FIFRA: therefore, compliance with federal law will normally meet the commands of state authority. Registration laws of this type have been adopted in more or less similar form by forty-seven of the fifty states. Only Alaska, Delaware and Indiana are without state labeling regulations.[55]

State registration laws are relatively uniform when compared to use and application laws. Other than the Federal Aviation Agency regulations, no applicable federal counterpart to these laws exists since they regulate activities which are by their nature normally intrastate. Some states have taken significant steps to insure ample licensing provisions, specific provisions as to the use of pesticides, inspection of equipment and other regulations. Other states, however, either have no laws dealing with pesticide use or have what might be considered only partial coverage of the problem. While the lack of uniformity is evident, such divergence can be explained in part by the varying needs and desires of the people in different areas. Yet it is certain that the greatest short-coming in the field of pesticide laws today must be the incomplete coverage within the states over the use and

55. Alaska does, however, have an Enabling Act which authorizes the registration of products and the issuance of regulations. Also, Indiana does control to some extent the use of pesticides by way of aeronautics regulations. Reg. No. 2, Ind. Aero. Comm. (1951). Indiana has recently been considering control of custom applicators, a proposal which has met with little past success. Delaware in 1968, did ratify the Council of State Governments' "Pest Control Compact" as a first step toward needed legislation. For a summary of state activities see Petty, *Functions of State Committees on Pest Control*, in SCIENTIFIC ASPECTS OF PEST CONTROL 374 (1966). Also, of importance is the federal disclaimer of jurisdiction over pest control operators except in cases of coloring of compounds. This opens for state control the activities of these businesses. 7 C.F.R. § 362.100 (1968). The Federal Government does in fact exercise some control over the use of pesticides by requiring agricultural aircraft operators to obtain certificates when they are engaged in the spraying of economic poisons. Certification is awarded by the FAA only when certain standards are met by the pilot. No pilot may, under these regulations, dispense an economic poison that is registered under FIFRA (1) for a use other than that for which it is registered, (2) contrary to any safety instructions or use limitations on its label or (3) in violation of any federal law or regulation. *See* 14 C.F.R. § 137 (1968). These rules do not relieve the agricultural aircraft operator from more stringent state laws which may be in effect. Assurance in the safety and efficacy of the use of pesticides in agriculture is the primary motive for passage of these rules which went into effect on January 1, 1966. 30 Fed. Reg. 8104 (1965). Also, on the federal level, as of January 1, 1968, children sixteen and under may no longer be employed in the handling and application of most dangerous pesticides.

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application of these potentially harmful substances, which have been known to cause injury through negligent and uninformed handling. Undoubtedly, these deficiencies can be overcome by centralized efforts exerted against each individual state problem.[56] However, more practically, a uniform act should be presented to the states in order to fill gaps existing in current state codes and to be adopted, in whole or in part, with or without variations, to suit particular circumstances. It is noteworthy that uniformity was stressed by the House Committee on Agriculture before the passage of the FIFRA so as to minimize conflicts between state laws.[57]

While there is much that could be said in support of uniform state pesticide use and application acts, there are very definite problems of enforcement that vary from state to state. Pragmatically, state and local officials have found it difficult to enforce licensing, inspections, examinations and technical rules over the use of pesticides. Insufficient appropriations and surveillance difficulties in controlling negligent and careless use are two major problems which face enforcement officers. Some states already have adequate means to supervise custom applicators, pest control operators and the like. Other states have poorly or liberally enforced powers in existence. Still others have no system through which control over these persons is maintained. A licensing system would, in reality, reduce the apparent threat to public health from pesticide contamination. Effective legislation would have to provide assurance that persons subject to the law are knowledgeable as to the characteristics and effects of the compounds and that they are proficient in techniques for avoiding dangers to human and animal life, as well as the dangers of damage to property, both public and private. States which now have controls over large scale users have met with success as varied as the laws themselves. However, it is clear that a program of enforcement is only as effective and vigorous as the agencies who administer it. Having well-written laws is one thing; adequate enforcement is quite another.

The great number of state statutes, both registration and use and application, are listed in appendix A. The list is a compilation of the major pieces of pesticide legislation now in force in the United States.[58]

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56. *See* Curran, *The Preparation of State and Local Health Regulations*, 49 Am. J. Pub. Health 314 (1959).

57. 1947 U.S.C. Cong. Serv. 1200, 1201.

58. For excellent compilations of laws in full text revised periodically, *see* Chemical Specialities Manufacturers Association, Economic Poisons (Pesticides) Laws (Rev. 1967); National Agricultural Chemicals Association, Law Guide (Rev. 1967); Manual of Pesticide Use and Application Laws (Rev. 1967).

III. Pesticide Use Liability

Statutory regulations exist to prevent improper or negligent use of pesticides. When this objective is not achieved, the result is death, injury or property damage. By over-dosage a farmer can destroy his own crop; through improper usage he can damage that of a neighbor. While not as clearly documented as the possible damage to vegetation when a substance is not given proper precautionary attention or is used improperly, the dangers of pesticide poisoning to man and domestic animals are of great concern.[59] One study in southern Florida has shown that pesticides "are definitely the most significant causative agents in accidental death by poisoning of children."[60] Each year, many children are poisoned by pesticides because of improper storage of those compounds, negligent disposal of containers in which dangerous residues may be present and the placing of deadly chemicals in soft drink bottles. Careless placement of pesticides within reach of young and inquiring hands has led to several tragedies. Children are, however, only a segment of the total pesticide mortality problem. In 1961, there were 119 deaths in the United States due to pesticides, with most of them ascribed to identifiable materials.[61] A little under one-half of the fatalities were adults.

The increased number of deaths and injuries resulting from the use of pesticides has led to more litigation in this area. However, poisonings have occurred in a violent manner without any outward signs of cause or origin, thus generating serious difficulties, not the least of which centers around legal responsibility. For example, DDT and other chlorinated hydrocarbon pesticides owe their effectiveness in part to their long persistence after application. Coupled with their moderately high toxicity, the persistence of some of the chlorinated hydrocarbons may pose a serious problem of causation when poisoning occurs some time after actual application.[62]

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59. *See* A. Lehman, Summaries of Pesticide Toxicity (1965) for an indication of the possible dangers to man of many pesticides used today. *See also* Hayes, *Toxicological Problems Associated with Use of Pesticides*, 5 Ind. & Tropical Health 118 (1964).

60. Reich, Davis & Davies, Pesticide Poisoning in South Florida, at 3 (to be published in Arch. of Environ. Health 1968). Davis states also that many more pesticide poisonings were very probably not discovered or diagnosed as such. *See* Joslin, Forney, Huntington & Hayes, *A Fatal Case of Lindane Poisonings*, Proc. Nat. Ass'n of Coroners 53 (1958) which involved the death of an 18 month old child who ate some lindane pellets which had been spilled in the family car. *See also* Ganci v. Rubino, 40 Misc. 2d 218, 241 N.Y.S.2d 981 (1963).

61. Hayes & Pirkle, *Mortality from Pesticides in 1961*, 12 Arch. of Environ. Health 43 (1968).

62. *See Hearings on S. Res. 27*, *supra* note 11, pt. 6, at 1167-68 (1963); Straube, Bricker, Gemmell, Lawler, Coster, Corbin & Tomasek, *Persistent Pesticides*, 22 Ag. Chem. 20 (1967); Lichtenstein, *Persistence and Degradation of Pesticides in the Environment*, in Scientific Aspects of Pest Control 221 (1966).

Pesticide characteristics also increase the ways in which injury may be caused. Since some potentially harmful pesticides have been found to be absorbed readily into the fat of cattle which feed upon vegetation sprayed with these compounds, the appearance of chemical residues in milk may create another field in pesticide liability.[63] Actually, however, the acute instances of pesticide poisoning, while patently important to a legal analysis, are not of greater concern than the less obvious, more subtle and potential effects of low level, long-term exposure of pesticide chemicals on man.[64] Whereas most of the older compounds, such as the arsenicals, offer serious threats by oral ingestion or by the respiratory route (a major industrial hazard), many of the newer compounds have the added danger of possible dermal absorption. A sizable number of pesticide poisonings are known to have occurred either by way of direct application and gross contact, through improper storage and disposal of containers, or by way of acute occupational and environmental exposure.[65] Agricultural spraymen and exterminators can

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63. Clifford, *Pesticide Residues in Fluid Market Milk*, 72 PUB. HEALTH REP. 729 (1957); *see* Dale, Gaines & Hayes, *Storage and Excretion of DDT in Starved Rats*, 4 TOXICOLOGY AND APPLIED PHARMACOLOGY 89 (1962); Hayes, Quinby, Walker, Elliott & Upholt, *Storage of DDT and DDE in People with Degrees of Exposure to DDT*, 18 ARCH. OF IND. HEALTH 398 (1958); Hayes, *Monitoring Food and People for Pesticide Contact*, in SCIENTIFIC ASPECTS OF PEST CONTROL 314 (1966); Dale & Quinby, *Chlorinated Insecticides in the Body Fat of People in the United States*, 142 SCIENCE 593 (1963).

64. Kraybill, *Federal Health Activities in the Field of Pesticides*, in PROCEEDINGS OF THE SHORT COURSE ON THE OCCUPATIONAL HEALTH ASPECTS OF PESTICIDES 287 (E. Link & R. Whitaker ed. 1964).

65. *See, e.g.*, Hayes & Pirkle, *supra* note 61, in which 119 pesticide deaths in 1961 were analyzed. Hayes and Pirkle attributed 58 per cent of these deaths to compounds in use before the discovery of DDT, 34 per cent were caused by newer compounds, and in 8 per cent of the reported cases no specific compound was attributable. Fifty-one percent of the cases were children under ten. This figure emphasized the need for control over the storage and disposal of pesticides which may come into the hands of children unable to comprehend the danger of the substances. Geographically the Hayes study pointed out that the Southwestern and mountain regions of the United States showed a higher ratio of pesticide deaths. The relatively small number of pesticide poisonings from California is noteworthy in view of the extensive use of pesticides in that state. A sound explanation for this is the comprehensive and well-administered set of laws in that state. In spite of this, a recent study reported 850 pesticide accidents leading to personal injuries in California in 1965. The Pesticide Regulatory Program in California, Address by Hillis, International Conference on Educational Aspects of the Pesticide-Chemical Usage (July 10, 1967). *See also* Davies, Frazier, Mann, Reich & Tocci, *Disturbances of Metabolism in Organophosphate Poisoning*, in INDUSTRIAL MEDICINE AND SURGERY Jan., 1967, at 58. This study analyzed the deaths in Dade County, Florida, from pesticide poisoning in the years 1959-1965. In that period, seventy-two people died of pesticide poisoning. Twenty-eight of the deaths were deemed accidental, nineteen involved children and forty-two of the total were attributed to organophosphate pesticides (most notably, thirty-three of that number were killed by parathion).

encounter almost unperceptible but dangerous dermal exposure from fine mists created by their equipment. Such long-term exposure to pesticides might be treated by a prospective plaintiff as a continuing tort, employed in some medical malpractice and poisoning litigation.

While the areas of potential litigation are unlimited, the cases have tended to be concentrated in three areas: manufacturers and sellers, aerial spraying and structural extermination.

A. Manufacturers and Sellers

Manufacturers and sellers may be liable for injuries which result from basically three means: defective products, failure to warn adequately of possible harmful effects to humans, animals or plant life that may occur even when directions are followed, and fraudulent or misleading claims.[66] Defective products can cause serious injury to those applying a pesticide and to the neighboring area which, absent any negligence, normally should be free of harm. While federal and state laws generally demand accurate and comprehensive statements on labels and prospectuses concerning harmful effects and contraindications,[67] in the case of a resulting injury, a manufacturer may be liable under a common law duty to warn of possible hazards and, at the same time, may be guilty of a statutory violation for

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Another report catalogued 129 non-fatal pesticide poisonings in Cameron County, Texas, from 1961 through 1966. G. Reich, G. Galler & J. Wizeman, The Characteristics of Pesticide Poisoning in South Texas (United States Public Health Service, unpublished, 1967). Dermal exposure was found to represent 98 per cent of the cases. This report, unlike others, studied poisonings of 126 adult males, one adult female and only two children. By occupation, seventy-four were workers for spray pilots, thirty-eight were farm laborers, eight spray pilots, four formulators or workers in formulating establishments, one farmer, two children and two were unknown. Only six of these cases had been previously poisoned. Ethyl and/or methyl parathion were found responsible for 96 per cent of the reported poisonings. *See also* Wolfe, Durham & Armstrong, *Exposure of Workers to Pesticides*, 14 ARCH. OF ENVIRON. HEALTH 622 (1967); Hayes, *Monitoring Food and People for Pesticide Content*, in SCIENTIFIC ASPECTS OF PEST CONTROL 314 (1966); Arterberry, Durham, Elliott & Wolfe, *Exposure to Parathion*, 3 ARCH. OF ENVIRON. HEALTH 476 (1961); Reich, Davies & Davies, Pesticide Poisoning in South Florida (to be published in ARCH OF ENVIRON. HEALTH 1968).

66. Products liability is currently one of the most actively expanding fields of law. For a comprehensive annotation on the liability of manufacturer or seller for injury caused by animal feed or medicines, crop sprays, fertilizers, insecticides, rodenticides, and similar products, *see* 81 A.L.R. 2d 138 (1962). As to manufacturers' duty to warn generally, *see* 76 A.L.R.2d 9 (1961). *See also* Reasor-Hill Corp. v. Kennedy, 224 Ark. 248, 272 S.W.2d 685 (1954) (insecticide manufacturer). Claims of fraud are the least used theory upon which plaintiffs have based their cases. *But see* Kramer v. Carbolineum Wood Preserving Co., 105 Wash. 401, 177 P. 771 (1919) (action against seller of insecticide).

67. *See* note 18, *supra*.

mislabeling.[68] Fraudulent or misleading claims can cause damage in a variety of ways. If the substance is more potent than indicated, harmful residues may occur, and in some cases, damage from over-application may result. If, on the other hand, a pesticide has a weak dosage, it may cause injury by nature of its ineffectiveness.

Liability of a manufacturer or seller of pesticides for injury to a person or property allegedly caused by such compounds is in a state of change.[69] Generally, however, the principles of law deducible from various jurisdictions may be stated briefly. A duty of care binds manufacturers and sellers of pesticides.[70] This duty includes a duty to warn of product-connected dangers,[71] a duty on the part of the manufacturer to subject the compound to reasonable tests,[72] and a duty on the part of the seller to subject the product to reasonable inspection.[73] The first and second duties are partially incorporated in the FIFRA, the various state registration laws, commercial law and the law of torts. The third is a common law duty imposed as a matter of law and practicality.

While a manufacturer can be held liable for an injury caused by a breach of these duties either by statutory violation or by way of common law negligence principles, the area of greatest activity is the possible liability under a breach of warranty theory.[74] There is considerable authority to the effect that manufacturers and sellers of pesticides are bound by the implied

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68. *See* note 90, *infra*. *See also* 15 U.S.C. §§ 1263-70 (1964) (mislabeling on the federal level).

69. *See* 81 A.L.R.2d 138 (1962); R. HURSH, AMERICAN LAW OF PRODUCTS LIABILITY §§ 21:39-:49 (1961).

70. Manufacturer's duty: E.I. DuPont de Nemours & Co. v. Baridon, 73 F.2d 26 (8th Cir. 1934) (fungicide); Rose v. Buffalo Air Serv., 170 Neb. 806, 104 N.W.2d 431 (1960) (insecticide). Seller's duty: Crouse v. Wilbur-Ellis Co., 77 Ariz. 359, 272 P.2d 352 (1954) (insecticide).

71. Manufacturer's duty to warn: Orr v. Shell Oil Co., 352 Mo. 288, 177 S.W.2d 608 (1944); Jamieson v. Woodward & Lothrop, 247 F.2d 23 (D.C. Cir), *cert. denied*, 355 U.S. 855 (1957). Seller's duty to warn: Crouse v. Wilbur-Ellis Co., 77 Ariz. 359, 272 P.2d 352 (1954). The plaintiff must prove more than the injury and the use of a suspected substance. *See* Scientific Supply Co. v. Zelinger, 139 Colo. 568, 341 P.2d 897 (1959).

72. Manufacturer's duty to test: Chapman Chem. Co. v. Taylor, 215 Ark. 630, 222 S.W.2d 820 (1949).

73. A manufacturer's or seller's duty of inspection means that he will be held liable only when he sells products which contain imperfections discoverable by the exercise of the general duty of reasonable care imposed upon him. 81 A.L.R.2d 138, 149 (1962).

74. *But see* 81 A.L.R.2d 138, 157-62 (1962). For cases involving implied warranties, *see* Burr v. Sherwin Williams Co., 42 Cal. 2d 682, 268 P.2d 1041 (1954); Diamond Alkali Co. v. Godwin, 100 Ga. App. 799, 112 S.E.2d 365 (1959); Van Antwerp-Aldridge Drug Co. v. Schwarz, 263 Ala. 207, 82 So. 2d 209 (1955); Yormack v. Farmers' Co-op. Ass'n, 11 N.J. Super. 416, 78 A.2d 421 (1951).

warranty of fitness for a particular purpose and the implied warranty of merchantability. Both of these warranties are dealt with in the Uniform Commercial Code, which has been adopted in forty-nine states.[75] Moreover, such a manufacturer or seller may bind himself by express warranties, the breach of which will give rise to liability for resulting injuries.[76]

The warranty theories, while apparently simple and easily applied, are fraught with problems. Traditionally, warranty liability could be claimed only by a plaintiff who could prove that he was injured; that the injury resulted from the manufacturer's negligence and that he was in privity of contract—that is, a direct contractual relation involving the sale of the product—with the manufacturer.[77] The last problem of proof, privity of contract, has been an important stumbling block to the plaintiff who was injured due to the manufacturer's negligence yet was unable to prove the relationship. Undoubtedly the most significant legal factor in such litigation is the view that privity of contract is a prerequisite to recovery in a negligence action growing out of a product-caused injury. It is obvious in most jurisdictions that absent an adequate showing of privity or an adequate allegation of the inherent danger of pesticides, the plaintiff may not recover when he or his property has been injured by a pesticide seller's or manufacturer's negligence. The area of privity, however, is in a state of transition. A few jurisdictions have altered this requirement or wholly obliterated it; however, many have retained the privity doctrine.[78] It is

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75. The implied warranty of fitness for a particular purpose is found in Uniform Commercial Code [hereafter U.C.C.] § 2-315; the implied warranty of merchantability is found in U.C.C. § 2-314. *See* Brown v. Howard, 285 S.W.2d 752 (Tex. Civ. App. 1955) (dealing with an implied warranty of merchantability for a cattlespray); Patrick v. Carrier Stevens Co., 358 Mich. 94, 99 N.W.2d 518 (1959) (warranty of safety for a mink flea repellant). Louisiana has not adopted the U.C.C.

76. Express warranties are governed by U.C.C. § 2-313. *See also* Van Antwerp-Aldridge Drug Co. v. Schwarz, 263 Ala. 207, 82 So. 2d 209 (1955); Sawan, Inc. v. American Cyanamid Co., 211 Ga. 764, 88 S.E.2d 152 (1955) (insecticide injured seed corn); Simpson v. American Oil Co., 217 N.C. 542, 8 S.E.2d 813 (1940) (insecticide injury); Start v. Shell Oil Co., 202 Ore. 99, 273 P.2d 225 (1954) (insecticide damaged lily crop); Ingraham v. Associated Oil Co., 166 Wash. 305, 6 P.2d 645 (1932). Express warranties which are breached generally lead to absolute liability on the part of the defendant. W. PROSSER, THE LAW OF TORTS 651 (3d ed. 1964).

77. *See generally* 75 A.L.R.2d 39 (1961); 81 A.L.R.2d 138, 161 (1962).

78. Of particular significance is Henningsen v. Bloomfield Motors, Inc., 32 N.J. 358, 161 A.2d 69 (1960), one of the first decisions rejecting outright the requirement of privity. Other states besides New Jersey which have rejected the rule requiring a showing of privity by court decisions are Arkansas, California, Connecticut, Illinois, Iowa, Kentucky, Michigan, Mississippi, Missouri, New York, Ohio, Oklahoma, Oregon, Pennsylvania and Tennessee. Arkansas and Virginia have statutes denying the lack of privity prerequisite as a defense available to a manufacturer or dealer of a defective product. Other states are borderline or still

generally agreed that, in the future, the privity of contract prerequisite may be wholly eliminated from product liability cases, especially when dangerous compounds such as pesticides are involved; until then, it may continue to be an important factor to consider in a case of pesticide injury and subsequent litigation against a manufacturer or seller.[79] It is well to note, however, that in a suit of this sort, no formal prerequisites to recovery may be required if, as a matter of law, the pesticide involved can be considered an inherently dangerous product.[80]

Another somewhat less common theory employed by a plaintiff suffering damage from a deficient pesticide is that of fraud and deceit.[81] Here again, if a plaintiff alleges fraud in the sale of a pesticide in an effort to recover for some injury he has suffered, he may be forced to prove that he was in privity of contract with the manufacturer or seller. As with the warranty theory, however, the doctrine of privity in relation to fraud is also changing, although the inherent danger of the compound has had nothing to do with the decline of the doctrine in these cases.[82] Fraudulant advertising and other misleading inducements will, in the future, come under closer legal examination as part of the trend toward more effective consumer protection. Recent stress put upon the necessity to disclose fully all product connected data will no doubt enhance the development of more extensive controls than are found presently in statutory and common law.

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require privity. Privity, for instance, was required in Spada v. Stauffer Chem. Co., 195 F. Supp. 819 (D. Ore. 1961) (concerned herbicide EPTAM 6E).

79. *See* note 77, *supra*.

80. Generally, those who market an inherently dangerous product are held to strict liability, that is, no allegation of negligence must be made prerequisite to the plaintiff's recovery. Strict liability will never be found unless the defendant is aware of the danger and has voluntarily allowed the product to be marketed. Mere negligent failure to discover or prevent is not enough, although it may, of course, be an independent basis of liability once the defendant willfully markets the product which is inherently dangerous, thus becoming an insurer against the consequences of his conduct *See generally* W. PROSSER, THE LAW OF TORTS 519 (3d ed. 1964).

81. Fraud, while not often alleged in pesticide cases, usually comes about by way of express warranties made by the manufacturer or seller to the buyer. The elements of fraud (or its old common law counterpart, deceit) are first, a misrepresentation; second, knowledge or belief on the part of the defendant that the representation is false; third, intention by the defendant to induce the plaintiff to rely upon the misrepresentation; fourth, justifiable reliance on the part of the plaintiff; and fifth, damage to the plaintiff resulting from such reliance. *See* W. PROSSER, THE LAW OF TORTS 659 (3d ed. 1964) for an excellent and detailed discussion. *See also* Kolberg v. Sherwin Williams Co., 93 Cal. App. 609, 269 P. 975 (1928) (action against manufacturer of product designed to destroy citrus tree scale).

82. *See* 75 A.L.R.2d 39 (1961) for complete discussion. Inherent danger will not enter into a case of fraud since fraud is based upon a misrepresentation of the product's nature rather than the dangerous consequences of the product's use. Both theories, of course, might be alleged simultaneously under the same set of circumstances.

B. Aerial Spraying

One area in which the actual use of pesticides has created a significant amount of litigation is aerial spraying.[83] Most of the cases in this field have involved damage to crops or vegetation; however, there are some which involve injury to man and animals, including wildlife.[84]

The growth of custom spraying and dusting, the rapidity of new discoveries, the possibility of injury to man's health, plants and animals, including wildlife, on lands and waters adjacent to those being sprayed or dusted, and the possibility of both dangerous and fraudulent practices makes public regulation increasingly necessary.[85] Cognizant of these issues, the

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83. For an excellent, although older discussion, *see* 12 A.L.R.2d 436 (1950) (liability for injury consequent upon spraying or dusting of crop). *See also* Burns v. Vaughn, 216 Ark. 128, 224 S.W.2d 365 (1949) (drift of 2,4-D in wind); Hammond Ranch Corp. v. Dadson, 199 Ark. 846, 136 S.W.2d 484 (1940) (spray pilot killed stock with arsenic spray); S.A. Gerrard Co. v. Fricker, 42 Ariz. 503, 27 P.2d 678 (1933) (bees killed by aerial spraying); Lenk v. Spezia, 95 Cal. App. 2d 346, 213 P.2d 42 (1949) (drift of arsenic killed bees); Brown v. Sioux City, 242 Iowa 1196, 49 N.W.2d 853 (1951) (loss of bees and honey due to pesticide spraying); Underhill v. Motes, 158 Kan. 173, 146 P.2d 374 (1944) (grasshopper poison spread in such a manner that cattle on adjacent farm could reach it); Traham v. Bearb, 138 So. 2d 420 (La. App. 1962) (damage to cotton field from weed spray used on neighboring rice field); Venie v. South Cent. Enterprises, 401 S.W.2d 495 (Mo. Ct. App. 1966) (herbicide damage to strawberries); Rose v. Buffalo Air Serv., 170 Neb. 806, 104 N.W.2d 431 (1960) (crops destroyed by insecticide); Young v. Darter, 363 P.2d 829 (Okla. 1961) (drift of pesticide); Cross v. Harris, 230 Ore. 398, 370 P.2d 703 (1962) (sprayer ruined crops with herbicide); Stull Chem. Co. v. Boggs Farmers Supply, Inc., 404 S.W.2d 78 (Tex. Civ. App. 1966) (herbicide damaged crops); Pitchfork Land & Cattle Co. v. King, 162 Tex. 331, 346 S.W.2d 598 (1961) (spray contractor held liable); Wise v. Hayes, 58 Wash. 2d 106, 361 P.2d 171 (1961) (manufacturer liable for improper labeling). *See also* 2 F. HARPER & F. JAMES, LAW OF TORTS § 14.6 (1956).

As a matter of further interest, when the United States Government conducted spraying operations in wildlife preserves, crop damage sustained by adjoining land owners was held non-compensible under the Federal Tort Claims Act. Dalehite v. United States, 346 U.S. 15 (1953); Harris v. United States, 205 F.2d 765 (10th Cir. 1953).

84. *See Hearings on S. 288*, *supra* note 47, pt. 10, at 2206; pt. 9, at 1811; and app. IV to pt. 1, at 985 (1964); Pesticides in Relation to Wildlife, Address by Dykstra, Conference on Pesticides and Public Health, May, 1967. *See* Hubbard Hall Chem. Co. v. Silverman, 340 F.2d 402 (1st Cir. 1965) (parathion deaths); Gonzalez v. Virginia-Carolina Chem. Co., 239 F. Supp. 567 (E.D.S.C. 1965) (spray pilot injury); McQuaide v. Bridgeport Brass Co., 190 F. Supp. 252 (D. Conn. 1960) (insecticide injury); Boyl v. California Chem. Co., 221 F. Supp. 669 (D. Ore. 1962) (Troix weed-killer injury). There are numerous criminal cases involving poisoning with pesticides, including several suicides. A report from Finland shows that deaths from suicide due to parathion rose from one in 1952 to ninety-four in 1957. Toivonen, Ohela & Karpainen, *Parathion Poisoning Increasing Frequency in Finland*, 2 LANCET 175 (1959). The study by Reich, Davis & Davies, *supra* note 65, revealed that suicides made up the majority of pesticide deaths in South Florida from 1956-1967. In those years sixty-nine suicides were reported due to pesticide ingestion.

85. *See* Scotton, Atmospheric Transport of Pesticide Aerosols, United States Dep't of

Department of Agriculture and the Department of Health, Education and Welfare limit the use of specific pesticides on certain crops through certain means of application, thereby alleviating hazards to the food supply and man's health.[86] State and local regulations also have been designed to meet the need for public regulation in some of the areas of concern.

Several difficult problems arise in connection with the application of pesticides. The question of liability for injury to persons, crops and animals resulting from drift of the materials is the most dramatic and one of the most important.[87] Damage can be quite substantial and often there are significant evidentiary problems. There is the initial question of placing responsibility for the drift of pesticides. This problem can be amplified seriously when more than one person was engaged in spraying in the locality or when the spraying took place so far away that the person is unknown. Still another problem in this area is that of causation. Was the negligence of the applicator the legal cause for the injury? Or was there some intervening cause, such as a totally unexpected gust of wind or a freak inversion layer?

The possibility of injury to formulators, applicators and spraymen themselves may become more significant legally if personal safety and hygiene as well as statutory controls are not given more attention. The workmen's compensation implications are vast, as are the common law entanglements generated by employee poisoning. Long-term, daily exposure to minute quantities of pesticides remains a troublesome consideration. Scientific research is, at best, in the first stages. The injuries or deaths that may have occurred have not yet come under detailed legal scrutiny. Toxicity levels are a definite problem because there may be differences between daily small-dose dermal exposure to which spraymen are subjected and the standardized lethal dose measurements for laboratory animals. Another difficulty is that several years of usage of particular pesticides by applicators

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Health, Educ. & Welfare Training Guide (1965). Around 350 million pounds of insecticides alone were used in the United States in 1962. They were, and are, distributed annually over ninety million acres or more (one acre out of twenty within the forty-eight contiguous states). Herbicides were used on just about the same number of acres with some overlap. Thus, the land area treated with pesticides is approximately one acre in twelve. About forty-five million pounds are used each year in addition in urban areas and around homes, much of this by municipal spraying operations and individual home owners. *See Hearings on S. Res. 27, supra* note 11, pt. 1, at 41 (1963). *See also* note 96, *infra*, FAA aerial spraying statistics. For an interesting article on the drifting of TEPP, a deadly insecticide, *see* Quinby & Doornick, *Tetraethyl Pyrophosphate Poisoning Following Airplane Dusting*, 191 J.A.M.A. 1 (1965).

86. For a list of pesticide uses for which registration under FIFRA has been denied, *see Hearings on S. Res. 27, supra* note 11, pt. 3, at 744-48 (1963).

87. *See* Chapman Chem. Co. v. Taylor, 215 Ark. 630, 222 S.W.2d 820 (1949); Lenk v. Spezia, 95 Cal. App. 2d 296, 213 P.2d 47 (1949).

with no adverse effects may have caused some workers to become lax in their observance of safety precautions. Also, contact with or drippage from sprayed foliage is of importance in the consideration of total exposure routes.

The liability problems could be decreased if there were proper standards and regulations set up to minimize the human error factor associated with such incidents. As the House Committee on Agriculture stressed in 1947, in support of the FIFRA, "a great measure of protection can be accorded directly through the prevention of injury, rather than having to resort solely to the imposition of sanctions for damage after injury has been done."[88] There is no way that an applicator of pesticides can anticipate unforeseeable, intervening or superseding causes, acts of God and the like. Injuries sustained due to those conditions are, under our present legal reasoning, dismissed as the price a few must pay for living in an organized society which is constantly attempting to improve its condition.[89] However, experience has shown that statutes and ordinances, when vigorously enforced, reduce or even eliminate a great number of the injuries that might have occurred absent any clearly defined legal guidelines.[90] Where injuries still occur despite statutory safeguards, common law principles are usually sufficient to deal with them.

It has been recognized that due care must be exercised by the applicator to see that weather conditions are correct, the time of day is right and the actual application is accomplished in such a way that the person or property of another or wildlife is not harmed.[91] To insure safety, some state laws require due notice of impending spray operations.[92]

Normally, the owner of the premises being sprayed is liable for any damage caused to persons, their property or wildlife.[93] When a property owner hires a custom applicator to spray his fields, the rules applicable to

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88. H. R. 313, 80th Cong., 1st Sess. (1947).

89. Of great importance to the pesticide cases involving spraying operations is the principle that the defendant is to be held knowledgeable of weather conditions in a particular area. W. PROSSER, THE LAW OF TORTS 312 (3d ed. 1964).

90. When injuries occur due to the use of a pesticide in violation of a law or ordinance, the negligence of the defendant may become irrebuttable and negligence "per se" liability may result. For instance, failure to label as required by law has resulted in negligence "per se" liability in at least two cases. Gonzalez v. Virginia-Carolina Chem. Co., 239 F. Supp. 567 (E.D.S.C. 1965); Perry Creek Cranberry Corp. v. Hopkins Agr. Chem. Co., 29 Wisc. 2d 429, 139 N.W.2d 96 (1966). *See also* W. PROSSER, THE LAW OF TORTS 141 (3d ed. 1964).

91. *See* 3 AM. JUR. 2d *Agriculture* § 47 (1962). *See also Hearings on S. Res. 288, supra* note 47, pt. 11, at 2463 (1964).

92. Jeanes v. Holtz, 94 Cal. App. 2d 826, 211 P.2d 925 (1949); Brown v. Sioux City, 242 Iowa 1196, 49 N.W.2d 853 (1951).

93. See cases cited *supra* note 83. For Federal Agricultural Aircraft Operations, *see* 14 C.F.R. § 137 (1968).

principals and agents make him liable for all the torts of the sprayer which occur in the course of business, especially when ultrahazardous or inherently dangerous activity is involved.[94] Therefore the landowner may be liable in damages if he should hire an applicator who negligently sprays pesticides or allows drift to occur from his operations. In such a case, the applicator also may be jointly liable with the property owner who hired him, and this joint responsibility can be of importance to a plaintiff since the landowner may be judgment proof while the applicator may have or may be required under state laws to possess sufficient financial responsibility.[95]

Most jurisdictions do characterize aerial spraying as an ultrahazardous activity.[96] Such activity carries with it the burden of using the highest degree of care and can impose absolute liability upon the landowner for any injury to a person which is caused by the use of that sort of pesticide.[97] In such a case, the injured party may readily recover damages without a showing of negligence when he himself is free of any contributory negligence or did not

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94. "The agriculturalist or farmer may not delegate the work of dusting or spraying a crop with poisonous insecticides to an independent contractor [or agent] and thus [completely] avoid liability." 3 AM. JUR. 2d *Agriculture* § 47 (1962). *See* McKennon v. Jones, 219 Ark. 671, 244 S.W.2d 138 (1951); Pendergrass v. Lovelace, 57 N.M. 661, 262 P.2d 231 (1953); Burke v. Thomas, 313 P.2d 1082 (Okla. 1957); Alexander v. Seaboard Air Line Ry., 221 S.C. 477, 71 S.E.2d 299 (1952). The ultrahazardous nature of aerial application is underlined by the unusual number of spray plane crashes in the United States. Such crashes hint at self poisoning as a cause. Since 1951 there have been from three hundred to four hundred crashes annually with thirty to fifty deaths. The accident rate is three times as high as other commercial flying. Reich & Berner, Aerial Application Accidents, 1963-1966; An Analysis of the Principal Factors (to be published in ARCH. OF ENVIRON. HEALTH 1968).

95. *See* 12 A.L.R.2d 436, 444 (1950). *See also* cases cited *supra* note 83; Sanders v. Beckwith, 79 Ariz. 67, 283 P.2d 235 (1955) (operator and landowner liable); Southwestern Bell Tel. Co. v. Smith, 220 Ark. 223, 247 S.W.2d 16 (1952) (operator and employer liable); Parks v. Atwood Crop Dusters, Inc., 118 Cal. App. 2d 368, 257 P.2d 653 (1953); Kentucky Aerospray, Inc. v. Mays, 251 S.W.2d 460 (Ky. 1952); Aerial Sprayers, Inc. v. Yerger Hill & Son, 306 S.W.2d 433 (Tex. Civ. App. 1957) (operator and landowner liable); Miller v. Maples, 278 S.W.2d 385 (Tex. Civ. App. 1954). Manufacturers may be joined as third party defendants under the Uniform Contribution Among Tort Feasors Act which is the law of many states.

96. *See* note 80, *supra*. *See also* Yuill, Isler & Childress, *Research on Aerial Spraying*, 1952 THE YEARBOOK OF AGRICULTURE 252. To demonstrate the amount of aerial application taking place in the United States, consider the official FAA aerial application flight hours logged in 1962: (a) monoplane: 476,966 hours; (b) biplane: 444,377 hours; (c) helicopter: 22,973. This gives a total in 1962 of 944,316 hours flown. It has been estimated that presently, over 1,000,000 hours are flown annually. Reich & Berner, *supra* note 94. *See also* note 56, *supra*; *Hearings on S. Res. 288*, *supra* note 47, pt. 10, at 2171 (1964); Billings, *Medical and Environmental Problems in Agricultural Aviation*, 34 AEROSPACE MEDICINE 406 (1963); Bruggink, Barnes & Gregg, *Injury Reduction Trends in Agricultural Aviation*, 35 AEROSPACE MEDICINE 472 (1964).

97. It is well to note the opinion of at least two legal scholars. "As the sprays have become better known, their obvious utility militates against imposing strict liability while their high

assume the risk of pesticide exposure.[98] The landowner is liable even if the sprayer is considered to be an independent contractor because the duty of care in the ultrahazardous spraying of highly poisonous substances cannot be delegated from the owner to the sprayer.[99] The same legal consequences apparently would follow in connection with crops or vegetation when an injurious herbicide is applied resulting in an injury or loss to the plant life on nearby property.[100] These injuries can be prevented by intelligent use and application of pesticides, with an awareness of the possible injurious effects of those materials on the surrounding environment.[101]

C. Structural Extermination

Another area involving pesticide liability deals directly with the question of an exterminator or pest control operator's responsibility for personal injury or death.[102] While most of the cases hold that the liability of one in the fumigation or pest control business depends upon a showing of negligence, several have held and still others have suggested that, by reason of the inherent danger of the operations, the applicator is absolutely liable without proof of negligence.[103] Since many jurisdictions now outlaw such highly poisonous substances as sodium fluoroacetate for rat control and hydrocyanic gas for general pest extermination, substitute compounds and

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potential for harm argues for it. It is not clear what the ultimate doctrine will be but it is likely that most plaintiffs will recover on one theory or another . . . ." 2 F. HARPER & F. JAMES, LAW OF TORTS § 14.16 (1956). *See* W. PROSSER, THE LAW OF TORTS 519 (3d ed. 1964). For absolute liability in cases involving toxaphene injury to fish, *see* Kentucky Aerospace, Inc. v. Mays, 251 S.W.2d 460 (Ky. 1962).

98. *See* W. PROSSER, THE LAW OF TORTS 426, 450 (3d ed. 1964). In some states contributory negligence may not be a defense to ultrahazardous activity, while in most states, assumption of risk is available as a defense regardless of the nature of the activity. *See also* Loe v. Lenhardt, 227 Ore. 242, 362 P.2d 312 (1961) (strict liability of aerial sprayer).

99. *See* note 94, *supra*; McKennon v. Jones, 219 Ark. 671, 244 S.W.2d 138 (1951); Southwestern Bell Tel. Co. v. Smith, 220 Ark. 223, 247 S.W.2d 16 (1952); Alexander v. Seaboard Air Line Ry., 221 S.C. 477, 71 S.E.2d 299 (1952); 2 F. HARPER & F. JAMES, LAW OF TORTS § 14.16 (1956).

100. *See* Gotreaux v. Gary, 232 La. 373, 94 So. 2d 293 (1957); Trahan v. Bearb, 138 So. 2d 420 (La. App. 1962).

101. *See* Wolfe & Durham, *Safety in the Use of Pesticides*, PROC. OF THE SECOND E. WASH. FERT. & PEST. CONF. 14 (1966).

102. *See* Luthringer v. Moore, 31 Cal. 2d 489, 190 P.2d 1 (1948); Holland v. St. Paul Mercury Ins. Co., 135 So. 2d 145 (La. App. 1961); Ellis v. Orkin Exterminating Co., 24 Tenn. App. 279, 143 S.W.2d 108 (1940). *See also* Chisholm, *The Nature and Uses of Fumigants*, 1952 THE YEARBOOK OF AGRICULTURE 331. Although not directly dealing with pest control operators, general household insecticide spray can interpretations are found in 7 C.J.R. §§ 362.113-117 (1968).

103. Luthringer v. Moore, 31 Cal.2d 489, 190 P.2d 1 (1948).

methods of greater safety may serve to change the strict liability standards enunciated by some courts. In some instances, such as contributory negligence on the part of the plaintiff, the plaintiff's assumption of risk or even the case of a person's trespassing upon fumigated property, pest control operators, otherwise negligent, were found not liable. However, both the owner of the property and the exterminator may be liable for a failure to warn a tenant or other person who has a right to be on the property of the use of pesticides.[104] The dangers revolving around the use of pesticides in structures are potent, especially when tenants are present during minor applications or are allowed to return too soon after a major extermination job has been done. Exterminators are required in some jurisdictions by statute or common law to know the nature and effect of the pesticides they use. A showing of the lack of such knowledge coupled with a resultant injury may be sufficient to constitute negligence and justify recovery for the plaintiff.

No less important are the problems created by a few unscrupulous exterminating companies which have been known to defraud the home owner in a variety of ways. False estimates of the costs and the gravity of infestation by termites, rats and other pests can result in serious financial outlays by the unwitting consumer. Partial or incomplete control of pests which necessitates repeat applications and ineffective control of particular problems are other difficulties which have required legal action.

For the most part, however, pest control operators do excellent work of great importance to the community. Self-regulation by pest control operators' associations and statutory control by some states and municipalities help insure the quality of their work.

IV. Pesticide Contamination in Transit

One of the most extreme consequences of the increased use of pesticides is the spillage or leakage of poisonous compounds in transit, resulting in the contamination of other goods and the subsequent poisoning of man and animals. While there are several instances of such poisoning reaching epidemic proportions, it is possible that even more minor cases have occurred, the generation and effect of which have been labeled unknown both in cause and symptomology. The recent poisonings in Mexico and Colombia involving parathion contamination of sugar and flour are graphic, up to date examples of what has happened in the past and may happen again absent a review of statutory adequacy.

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104. 72 C.J.S. *Poisons*, § 5 (1951).

The obvious difficulties in cases of contamination, from both a scientific and legal viewpoint, are the cause of the contamination, the tracing of the poisoned agent and the eventual isolation of the affected commodities. Even more difficult, however, are those problems concerning public awareness and medical diagnosis. Many occurrences have been diagnosed incorrectly, at least initially, or victims have failed to report less serious cases because of self-diagnosis of influenza, stomach upset or simply lack of concern for personal or familial well-being. The subtlety of pesticide contamination and the almost passive faith of the average consumer in wholesome and non-contaminated goods create underlying concern in this area.

Often, the cause of contamination has been found to be spillage or leakage of pesticide containers directly or indirectly on the agent. Also, with some frequency, spillage took place while in transit or at the time of loading or unloading. Evidence of such occurrences is, however, largely circumstantial in nature and direct evidence usually consists only of post-spillage observation of stains on packages, unusual odors and causative relationships between particular agents and the subsequent injuries. Persistence of contamination leads to a great many problems in tracing the source and cause of poisonings. Some pesticides have the characteristic of persistence in almost any environment; therefore, many months and miles may separate cause and effect in a poisoning case. In circumstances where cause and effect are only remotely connected, tracing and isolation as well as treatment of victims are often matters of conjecture. An investigator is faced with loosely connecting effects from an unknown cause.[105] From this, it is not difficult to assume that there may have been many instances of widely scattered poisonings about which no causal linkage can be determined.

If contamination in goods were more easily detectable and consumers on a world-wide basis were more aware of everyday hygienic safeguards, perhaps this concern would be alleviated. Universal problems, such as disregard or simple non-recognition of poisoned food and clothing, and ignorance of the dangers involved in the use and handling of pesticides will continue to be matters of grave importance.

The legal difficulties resulting from in transit contamination are obvious from a study of specific examples.

A. Examples of In Transit Contamination

Typically, cases of pesticide poisoning by way of contamination strike

105. For an account of investigatory procedures, *see* F. TANNER & L. TANNER, FOOD-BORNE INFECTIONS AND INTOXICATIONS 15-23 (1953); TANNER, PROCEDURE FOR THE INVESTIGATION OF FOOD-BORNE DISEASE OUTBREAKS (1966).

quickly and without warning. Suddenly hospitals and clinics are beseiged by a steady stream of people suffering from any one or all of the pesticide poisoning symptoms: nausea, headache, weakness, dizziness and collapse with convulsions, loss of consciousness, coma, areflexia and flaccid paralysis. In most cases, a common source of symptoms is identified; usually food, and most often bread made with contaminated flour, turns out to be the agent for the poisoning. One toxicologist has stated that although in most instances contamination has involved food, "the chemical deposits had little or nothing to do with residues in the usual sense."[106] So far as is known, no cases of illness of even a minor degree have resulted from eating food treated with pesticides according to label directions which correspond to accepted tolerances.

One group of recent poisonings was surrounded by a mixture of irony and coincidence. On June 3-5 and again on July 2-4, 1967, the City of Ad Dawhah (Doha), the capital of the oil-rich Sheikdom of Qatar, situated on a point of land off of the Saudi Arabian peninsula, was the scene of two separate pesticide epidemics. A total of twenty-four deaths and an estimated seven hundred illnesses occurred as a result of contamination of flour by the pesticide endrin. Bread of differing types was traced to a number of bakeries, which in turn traced their stock of flour to a ship of German registry. In New Orleans on March 18, 1967, the vessel had loaded ten thousand gallons of endrin bound for Khorramshahr, Iran. In Houston, on the 24th of March, the boat was loaded with three thousand bags of flour from a New York company bound for Doha. The endrin was stored on deck above the flour. After some Mediterranean stops and the voyage through the Suez Canal, the endrin was unloaded at Khorramshahr on May 14. There it was noticed that two pails were completely empty and that seventeen were leaking. Port authorities and those on board the ship made note of this, but apparently no further check was made for contamination of other cargo. Finally, the flour was unloaded at Doha on the 22nd of May.

In twelve days, the flour as bread was disseminated throughout Doha and into the homes of the victims. At first, when officials saw clear indications of massive illness, the local water supply was suspected; however, the common agent, bread, was soon discovered. In the midst of the investigation and quite suddenly, second and third mass poisonings took place in Doha two months later on July 2-4. After a full investigation in which deadly amounts of endrin were discovered in grain warehouses, the pieces began to fall in place. Sometime and somehow—the matter is still one of conjecture—the same

106. Hayes, *Epidemiology of Pesticides*, PROC. OF THE SHORT COURSE ON THE OCCUPATIONAL HEALTH ASPECTS OF PESTICIDES 109, 112 (E. Link & R. Whitaker eds. 1964).

flour as was eventually implicated in the June incidents was placed below the endrin and was contaminated with the pesticide while the bags were being loaded at Houston, during the voyage or while the pails were unloaded at Khorramshahr. The problem of circumstantial versus direct evidence is paramount in this instance. There is no direct evidence that any public health or other governmental official was contacted about or had knowledge of the spillage.

The fourth major occurrence in this chain of events is one which is remarkably similar and ironic in its agent. On July 14 and 15, 1967, in the town of Hofhuf (Al Hufuf), Eastern Province, Saudi Arabia, not far from Doha, another epidemic of equal proportions took place. The same pesticide, endrin, was found responsible for contamination of flour which was eaten as bread. Over five hundred illnesses were reported, but only two deaths resulted. A detailed investigation took place again, the suspected bakeries were found and unused bags of contaminated flour were confiscated and held for testing. Ironically, the flour was again identified as that manufactured by the same New York company; however, this shipment was carried on a Greek ship. This vessel had loaded 2,560 bags of flour on April 26th in New Orleans and stored them in the lower number five hold. Proceeding with the voyage, 123 tons of endrin in drums were loaded in New York and by May 10, the vessel was at sea again. As in the first incident, the endrin was placed on deck directly above the flour. On May 29, six tons of endrin were unloaded at Aqaba, Jordan. There was no note made of any spillage or leaking at that point. At Khorramshahr on the 23rd of June, 117 tons, the balance of the endrin, was unloaded. Unlike the case of the German vessel, there is no record nor any reason to suspect discovery of leakage or spillage of endrin at that particular point in the trip. Contamination must have taken place, however, sometime between May 10 and June 23; only at these times were both commodities together. On June 29 on arrival at Ad Dammam, Saudi Arabia, the main port for Hofhuf, there were noted a number of malodorous and stained flour sacks throughout the 2,650 being unloaded. There is no report of any further action taken after this discovery. Perhaps none was merited since initially the odor and stains were attributed to water splash and decomposition. The captain of the Greek ship did report, however, that they had experienced "heavy seas" during the voyage. A marine protest in the nature of an action for damages due to oil and water was filed at that point. The failure to note or claim damages for any pesticide damage is unexplained.

From Dammam the flour was presumably hauled overland some eighty miles to Hofhuf. There, fifteen days later, the third set of mass poisonings took place. In Hofhuf, quicker medical attention probably saved the lives of

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many. As in the Doha incidents, the legal cause cannot be determined except circumstantially. However, it must be noted again that the endrin was stored above the flour, thus bringing in gravity, stormy seas, possible rough handling, poor packing and sealing as feasible causative factors.[107]

The Middle-Eastern incidents point up the need for consideration of more stringent controls over the in-transit status of pesticides in the United States and the reporting of contamination detection. Such action has begun on the federal level and can be based in the future on local and state as well as international levels. However, these controls cannot be established solely on a unilateral basis; there must be a strong, enforceable and compatible multilateral approach to this problem. The need for multilateral support is evidenced by the documented case histories of pesticide epidemics caused by contamination in transit which have been scattered in many parts of the world.

Possibly the most famous and most disastrous pesticide epidemic occurred in Kerala, India, between April 13 and May 31, 1958. There were in this incident more than 380 cases of parathion (or "Folidol") poisoning with 102 deaths.[108] Contamination of food resulted from the leakage of twelve gallons of parathion over large consignments of food and cattle feed while in transit on the vessel *S.S. Jai Hind*. It is interesting to note that "although the [containers] . . . were labelled 'Poison' in bold types in red ink, in the shipping documents they had been declared 'harmless chemical.' "[109] One possible reason that so many people died is that quick medical attention was not available to all the victims. In addition, local health authorities were not alerted initially, even though insurance agents did investigate and make assessments on the losses.[110] It was not until much of the flour had been delivered, baked and eaten with disastrous results that authorities were able to trace the causative agent and isolate it completely.

Here, the need for ample rules and regulations concerning prompt reporting (with appropriate penalties for failure to report) is well illustrated.

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107. *See* Weeks, *Endrin Food Poisoning*, 37 BULL. WORLD HEALTH ORG. 499 (1967). Even though storing near food is discouraged, it is remarkable to note that not only does the very detailed merchant guide of the British Board of Trade omit endrin, but also it suggests that pesticides in general be stored on or under deck. *Contra*, 46 C.F.R. § 146.25-.45(j)(3) (1968). The government of Qatar in 1968 enacted a new set of regulations. Now, all foodstuffs must be fully labeled with pertinent information concerning the country of origin, address of exporter, type of commodity, weight, etc., as well as the warning words, "STOW AWAY FROM CHEMICALS."

108. Karunakaran, *The Kerala Food Poisoning*, 31 J. INDIAN M.A. 204 (1958).

109. *Id.* at 204.

110. *Id.*

In most instances, the shipper will report damage to his insurance company. A regulation requiring shippers to report incidents of this sort is one method by which enforcement and surveillance could be maintained over such events. Also, rules requiring insurance companies to report claims may be another separate and additional means by which these events can come to the attention of authorities. In addition, proper and adequate labeling, a concern of the United States Department of Agriculture in interstate or foreign commerce, must be effectively enforced.

On February 16-18, 1961, a mass poisoning with violent symptoms took place among crew members of a Liberian ship at the Polish port of Gdansk. Twelve cases of acute dieldrin poisoning were reported, none of which were fatal.[111] While this occurrence does not follow the classic epidemiological patterns, in that the sailors' food stores were poisoned by their own negligence, it does illustrate the distinct probability that spillage and contamination were caused by the action of the sea. The recommendations of one study are interesting if not somewhat extreme:

> [D]ue to numerous reports on cases of poisoning of man and animals, a tendency is now being exhibited towards limiting the use of insecticides of great invasiveness and toxicity, as for instance Dieldrin. Therefore such preparations, particularly in form of liquids and aerosol should be withdrawn from free sale. They can be applied in cases of real necessity and by qualified personnel keeping strictly to security regulations.[112]

While somewhat impractical in their legal viewpoint, these suggestions do illustrate the need for additional controls over pesticide use and storage, especially in a mobile environment which lacks stability.

In Fresno, California, in the fall of 1961, six children fell victims to one of the most bizarre pesticide contamination poisonings on record. Several physicians completed a detailed case history of two young boys out of this group who suffered phosdrin poisoning by wearing unwashed contaminated blue jeans.[113] The jeans had been purchased at a salvage sale and had been involved in a truck spillage incident approximately eight months earlier. Meanwhile, the clothing had been stored in an air-conditioned warehouse.

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111. Przyborowski, Rychard & Tyrakowski, *Mass Poisoning on a Ship Caused by the Insecticide Dieldrin*, 13 BULL. INST. MARINE MED. GDANSK. 185, 186 (1962). *See* Waterman Steamship Corp. v. Snow, 222 F. Supp. 892 (D. Ore. 1963), *aff'd sub nom*, General Acc. Fire & Life Assur. Corp. v. Snow, 331 F.2d 852 (9th Cir. 1964) (ship's hold sprayed with insecticide).

112. Przyborowski, *supra* note 111, at 188.

113. Warren, Conrad, Bocian & Hayes, *Clothing-Borne Epidemic*, 184 J.A.M.A. 266 (1963).

This case demonstrates the persistence of pesticides. Again, there was ample information to raise suspicion about the unsafe quality of the clothing; official insurance claims were filed for spilled phosdrin, and stained jeans. However, there is no record of any authority being notified of the accident. Definite rules, first to outlaw storage of pesticides near articles for human and animal consumption or human direct exposure and second to require prompt reporting of even minor spillages, overflows and leaks, are needed on both the local, national and international level.

Another epidemic has been reported involving persistence of the insecticide endrin.[114] In the rural district of Pontardawe, Wales, on May 2, 1956, forty-nine people came to local physicians' offices and hospitals with sudden onsets of pesticide poisoning. It was quickly ascertained that bread rolls were the common agent of contamination and the ultimate source was a shipment of one hundred sacks of flour, at least two of which had been heavily saturated with endrin. Over three gallons of endrin had been spilled in a rail delivery wagon later used for transport of the flour. The leakage occurred more than two months before the contamination took place. The flour was placed on the vehicle floor and there large quantities of the pesticide were absorbed by the bags. This case amply re-illustrates the remarkable persistence of certain compounds and the need for close inspection of carriers which transport articles for human use and consumption.

An important parathion epidemic in Malaysia occurred on September 6 and 7, 1959.[115] This incident involved thirty-eight poisonings, including thirty-five children and three adults. A total of nine deaths resulted, all children. In this instance, the usual occurrence took place, "the younger the child the more susceptible he was to toxic effects."[116] The agent for the poisoning was barley which was believed contaminated by spillage of parathion while both were in transit to Singapore on a cargo boat. Although these findings were not conclusive, no contamination was found to have taken place either at the loading or unloading points. However, one fact is certain: contamination was confined to the loose barley shipment of two hundred bags. One bag out of this lot, in fact, was deemed the ultimate causative agent for seven of the nine deaths.[117] The situation could have been much worse; quick action minimized the tragedy.

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114. Davies & Lewis, *Outbreak of Food-Poisoning from Bread Made of Chemically Contaminated Flour*, 2 BRIT. MED. J. 393 (1956).

115. Kanagaratnam, Boon & Hoy, *Parathion Poisoning From Contaminated Barley*, 1 LANCET 538 (1960).

116. *Id.* at 541.

117. *Id.* at 542.

> The immediate control measure of wide publicity to prevent the public from taking barley in any form effectively prevented further cases. This gave the health authorities time to carry out field investigations and seal off stocks of contaminated barley. The chemical findings were invaluable in establishing the causal agent. Qualitative and quantitative analyses suggest that the barley had been accidentally contaminated by spilling or other local contact. Rapid transmission of information to the Federation of Malaya prevented the occurrence of cases there, though bags of contaminated barley were found.[118]

Coordination and cooperation of officials, hospitals, field workers and chemists were the deciding factors averting a larger scale tragedy in this instance.

One of the more interesting cases of poisoning epidemics occurred in Vancouver, British Columbia, in March of 1964. Canadian physicians studied in detail the case histories of two young boys poisoned by contaminated flannelette bed sheets.[119] The contamination took place on board a ship which carried parathion and bales of sheeting in the same hold. The investigators concluded that the contamination occurred somewhere in transit. The insecticide had been discharged at a California port before reaching Vancouver. Marine insurance claims were filed and 594 sheets were reported stained or completely contaminated. The insurance officials had the bale rappings tested by a commercial laboratory, "which reported the presence of a heavy oily substance containing nitrogen but did not identify the poison."[120] It is noteworthy that there is no evidence that any report was made to public health or law enforcement agencies by the shipper, warehouse inspectors, insurance adjusters or the testing laboratory. Perhaps the laboratory analysis was not conclusive enough to generate suspicion. Eventually, therefore, the contaminated sheets were sold to a salvage dealer who both resold them and used them for his own family. One of the boys who suffered was admitted to the hospital, improved enough to be sent home and then, having slept again on the same sheets, relapsed with identical symptoms. Once the causative agent was discovered and isolated, he was soon cured. Initial diagnoses were general; although anti-cholinesterase poisoning was suspected, no evidence supported this conclusion until the causative agents were discovered.

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118. *Id.*

119. Anderson, *Parathion Poisoning From Flannelette Sheets*, 92 CANAD. MED. ASS'N J. 809 (1965).

120. *Id.* at 811.

> The following three points seem worthy of comment:
> (1) The value of close contact between the health officer and the practising physician is underlined. (2) The value of a public health network covering municipality, metropolitan area, province, nation and other involved nations is apparent. (3) *The need for national and international regulations covering the manufacture, transport and handling of these deadly substances is paramount.* [emphasis added].[121]

Another study[122] concerned endrin poisoning of three Egyptians in July of 1966. Again, flour made into bread was the causative agent. Contamination, although there is some conjecture on this point, was due to spillage in transit of the insecticide on flour bags. Quick medical diagnosis and treatment led to recovery of the victims and isolation of the agent. This case is another which follows the classic lines and yet again reinforces the need for more strict control of interstate and foreign shipping of dangerous substances.[123]

B. Federal Laws Concerning the Transportation of Pesticides

The Interstate Commerce Commission historically has controlled the transportation of all dangerous articles, whether they are explosive, poisonous or radioactive. With the creation of the Department of Transportation, regulation of these materials in transit fell to that new agency and its Hazardous Materials Regulations Boards.[124]

The basic regulations over the shipment of pesticides are enforced by way of criminal fines and imprisonment for lack of or improper information as to the "true character" of the "dangerous article(s)" shipped in interstate or foreign commerce.[125] The statute makes unlawful "any false or deceptive marking, description, invoice, shipping order or declaration" pertaining to

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121. *Id.* at 812.

122. Coble, Hildrebrandt, Davis, Raasch & Curley, *Acute Endrin Poisoning*, 202 J.A.M.A. 489 (1967).

123. F. TANNER & L. TANNER, FOOD-BORNE INFECTIONS AND INTOXICATIONS (1953) cites numerous chemically caused food poisonings. Most of these either do not involve transportation of food and pesticides together or nothing is known as to the cause of contamination.

124. *See* 49 C.F.R. § 170 (1968); 32 Fed. Reg. 16437 (1967).

125. 18 U.S.C. § 833 (1964); 49 C.F.R. § 171.2 (1968). Further regulations found in 49 C.F.R. § 171 (1968) are promulgated under the authority of 18 U.S.C. § 834 (1964). For an excellent discussion of the possible strict civil liability of the shipper or carrier of dangerous goods, *see* Markus, *Transportation of Dangerous Commodities*, PERSONAL INJURY ANNUAL (1964).

the character of a "dangerous article."[126] All packages containing "dangerous articles" shipped in interstate or foreign commerce must be plainly marked on the outside of the container.[127] "Dangerous articles" are included in a commodity list, all of which are subject to further regulation.[128] Each article is classified,[129] listed for packing specifications,[130] listed for exemptions,[131] further enumerated for labeling required[132] and delineated as to the allowable maximum quantity other than some specific poisons in one outside container shipped by rail express.[133] Any article not described under the commodity list "must be prepared and offered for shipment in compliance with the regulations for the group within which it is properly classified."[134] Therefore, while many of the common pesticides are listed under the schedule of dangerous articles, some of those not specifically treated are brought under control by the broad definition of "class A" or "extremely dangerous poisons": "poisonous gases or liquids of such nature that a very small amount of the gas, or vapor of the liquid, mixed with air is dangerous to life."[135] These class A poisons are controlled by strict packing regulations. They may not be offered for transportation by rail express.[136] Nor may class A poisons be loaded into or transported in any cargo tank.[137] It is not permissible to transport a class A poison if there are any interconnecting means between the containers.[138] Proper precautionary closing and cushioning is required as well as precise cylinder design if such packing is used.[139] Those class A poisons not specifically described have general packing regulations while those described on the commodity list have more specific and precise methods governing them.[140]

Less dangerous poisons, class B, are those "known to be so toxic to man as to afford a hazard to health during transportation, or which, in the ab-

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126. 18 U.S.C. § 833 (1964); 49 C.F.R. § 171.2 (1968).
127. 18 U.S.C. § 833 (1964); 49 C.F.R. § 171.2 (1968).
128. 49 C.F.R. § 172.5 (1968).
129. *See* 49 C.F.R. § 172.4 (1968) for classifications and 49 C.F.R. § 173.325 (1968) for classes of poisonous articles.
130. *See* 49 C.F.R. §§ 173.326-.96 (1968) (poisonous compounds packing specifications).
131. *Id.*
132. 49 C.F.R. § 172.5 (1968).
133. *Id.*
134. 49 C.F.R. § 172.2 (1968).
135. 49 C.F.R. § 173.326 (1968).
136. *Id.*
137. 49 C.F.R. § 173.327(c) (1968).
138. 49 C.F.R. § 173.327(d) (1968).
139. 49 C.F.R. §§ 173.327(a), (b), .34, .301(g) (1968).
140. *See* 49 C.F.R. § 173.328 (1968) for general specifications.

sence of adequate data on human toxicity, are presumed to be toxic to man" because of supporting data on oral toxicity, toxicity by inhalation or toxicity by skin absorption to laboratory animals.[141] All class B poisons, which contain most of the pesticides except those in class A, namely parathion, TEPP and other organo-phosphates with compressed air, are subject to certain packing regulations.[142] Containers for class B poisons must be properly sealed and cushioned;[143] containers should not be entirely filled to prevent leakage due to expansion of the contents;[144] liquid poison must not be loaded into domes of tank cars;[145] and no cargo tank shall be completely filled with containers.[146] Some class B poisons need no special marking for outside containers and they are specified on the commodity list as "exempt."[147] These same exempt poisons may be shipped in glass or earthernware containers of a specified size when properly protected from outside damage.[148] The poisons not specified on the commodity list are subject to specific packing regulations.[149]

Labeling of dangerous article containers is required by the rules with standard coloring and lettering clearly specified.[150] Labels for such goods as pesticides are diamond shaped with red lettering on a white background and include such phrases as: "KEEP AWAY FROM FEED OR FOOD PRODUCTS," "KEEP AWAY FROM FOOD PRODUCTS," "IF LEAKING DON'T BREATHE FUMES, TOUCH CONTENTS, SWALLOW," and "IF LEAKING—FUMES MAY BE DANGEROUS."[151] The shipper must describe the dangerous articles being shipped.[152] He must certify that these articles are properly described, marked and packed in accordance with the regulations.[153] The new amendments prohibit transportation of pesticides in the same car with food or feed[154] which is not enclosed in hermetically sealed containers, make mandatory

141. 49 C.F.R. § 173.343 (1968) (toxicity tests and standards for laboratory animals).

142. *See* 49 C.F.R. § 173.334 (1968) for parathion and TEPP as well as compressed organophosphate packing rules. Class B poisonous liquid rules are found in 49 C.F.R. § 173.344 (1968); the regulations for solids are in 49 C.F.R. § 173.363 (1968).

143. 49 C.F.R. §§ 173.344, .363 (1968).

144. 49 C.F.R. § 173.344(b)(1) (1968).

145. *Id.* at § 173.344(b)(3).

146. *Id.* at § 173.344(b).

147. 49 C.F.R. §§ 173.345, .364 (1968).

148. 49 C.F.R. § 173.345 (1), (2) (1968).

149. 49 C.F.R. § 173.346 (1968).

150. 49 C.F.R. §§ 173.402-.404, .409 (1968).

151. 49 C.F.R. §§ 173.409(a)(2), (b)(1) (1968).

152. 49 C.F.R. § 173.427 (1968).

153. 49 C.F.R. § 173.430 (1968).

154. 49 C.F.R. §§ 174.532(m), 175.655(k) (1968).

inspection and cleaning of cars used to transport class B poisons,[155] and require airtight nonpermeable containers for food packaging.[156] All this is designed to supplement package and label warnings with practical rules.

Rail freight is governed explicitly as to loading, unloading, packing and handling of dangerous articles.[157] Violations of major proportions, accidents and leaking or broken containers are to be reported by the rail carrier to the Office of Hazardous Materials of the Department of Transportation and to the Bureau of Explosives.[158] Any violations are punished by fines not over $1,000 and/or imprisonment for one year.[159] An extensive chart explains what dangerous articles can and cannot be loaded, transported or stored together.[160] Poisonous gases or liquids, in cylinders, projectiles or bombs, for instance, cannot be loaded, transported or stored on rail carriers with any explosives, ammunition, detonators, fireworks or propellants.[161] Rail cars must be placarded with specific signs which warn of their contents.[162] Placards must state that leaking liquid contents, fumes or vapors should be avoided.[163] Empty but dangerous tank cars or other vehicles must be posted with appropriate warnings.[164] Tank cars which have contained:

> arsenic, arsenate of lead, sodium arsenate, calcium arsenate, Paris green, calcium cyanide, potassium cyanide, sodium cyanide, or other poisonous articles, which show any evidence of leakage from packages, must be thoroughly cleaned after unloading before cars are again placed in service.[165]

A similar rule is applied to loose powders or other dangerous articles.[166]

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155. 49 C.F.R. §§ 174.566(a)(1) (1968).

156. 49 C.F.R. § 174.655(k) (1968).

157. *See* 49 C.F.R. §§ 174.500-.602 (1968).

158. 49 C.F.R. § 174.508 (1968). Damaged but not leaking goods are forwarded to their destination. Leaking packages which are discovered cannot be forwarded until repaired or reconditioned and must be safely stored until proper authorities can arrive to investigate. 49 C.F.R. § 174.588(c) (1968). Leaking tank cars are covered in 49 C.F.R. § 174.594 (1968).

159. 18 U.S.C. § 834(f) (1964).

160. 49 C.F.R. § 174.538 (1968).

161. *Id.* It is well to note that in Great Britain, dangerous articles such as pesticides have no intermingling restrictions with other dangerous articles. Board of Trade, Carriage of Dangerous Goods in Ships (1966).

162. 49 C.F.R. §§ 174.540-.557 (1968).

163. 49 C.F.R. §§ 174.551-.553, .555-.557 (1968).

164. 49 C.F.R. § 174.563 (1968).

165. 49 C.F.R. § 174.566(a) (1968).

166. 49 C.F.R. § 174.566(c) (1968). Steel rail hoppers which contained poisons of either class must be washed out thoroughly after unloading. 49 C.F.R. § 174.566(b) (1968).

More onerous state and local restrictions on acceptance, transportation or delivery of dangerous articles preempt any federal sanctions and may be imposed upon the carrier.[167] Any rail cars fumigated or treated with any dangerous liquid or gas must also be appropriately placarded.[168] Handling of dangerous articles when unloaded is also covered fully.[169]

Cars in a freight train with placards reading "'POISON GAS,' 'FLAMMABLE POISON GAS,' or containing poison liquids, class A such as the pesticides parathion (compressed gas) and TEPP"[170] may not be transported in a passenger train[171] or in cars adjacent to passenger-occupied cabooses or cars.[172] Class B poisons in like situations require appropriate placarding and no occupants.[173] Placarded loaded tank cars containing dangerous articles may not be handled next to occupied passenger cars, certain flatcars, cars placarded "EXPLOSIVES," occupied engines or cabooses or cars "loaded with live animals or fowl, occupied by an attendant."[174]

Detailed inspection and examinations after accidents occur are mandatory.[175] Leakage discovered in cars containing dangerous articles also makes mandatory immediate detailed inspection, identification, cleaning and other safety measures.[176] In case of a wreck, examination, removal and isolation of contaminated or dangerous packages or entire cars is ordered.[177] In case of an accident involving a pesticide, there are new procedures outlined for full compliance.[178]

No dangerous articles, namely poisons in class A or B, may be transported as rail baggage.[179] Violation of this rule, rail baggage fires and accidents are to be reported to the Bureau of Explosives immediately.[180]

Dangerous articles may be shipped also by common, contract or private

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167. 49 C.F.R. § 174.575 (1968).
168. 49 C.F.R. § 174.579(b) (1968).
169. *See* 49 C.F.R. § 174.586 (1968).
170. 49 C.F.R. § 174.589(k) (1968).
171. 49 C.F.R. § 174.589(m) (1968).
172. 49 C.F.R. § 174.589(m)(1) (1968).
173. 49 C.F.R. § 174.589(m)(2) (1968).
174. 49 C.F.R. § 174.589(j) (1968). It is presumed that the same animal cars, if not occupied by an attendant, could be placed next to any tank car carrying dangerous articles.
175. 49 C.F.R. § 174.600 (1968).
176. 49 C.F.R. § 174.597 (1968).
177. 49 C.F.R. § 174.600 (1968).
178. *E.g.*, 49 C.F.R. § 177.860(a)(1) (1968).
179. 49 C.F.R. § 176.702 (1968).
180. 49 C.F.R. § 176.707 (1968).

motor carriers on the public highway if no violation of the rules occurs.[181] Accidents must be duly reported,[182] proper labels must be affixed (for instance, blue letters on a white background for class A and B poisons) to containers and truckloads,[183] and only dangerous articles on the commodity list not forbidden for motor carriers may be transported.[184] Care in loading arsenicals is stressed[185] and no class A poisons may be carried in any cargo tank or when their containers are interconnected in any way.[186] Poisons of any class may not be loaded with explosives of any type, detonators, ammunition, fireworks or flammable liquids.[187] In accidents concerning motor carriers and poisons which are "flammable, noxious, or toxic, every available means shall be employed in the protection of persons or property or in the removal of hazards or wreckage, from congregating in the vicinity."[188] In motor carriers and cargo tanks "care shall also be taken to prevent any poison . . . from contaminating streams or flowing or being spilled into sewers, and poison in powdered form from being scattered by wind."[189] The new regulations outline briefly procedures for notification of pesticide spillage or leakage. These rules include investigation, notice, removal of goods and decontamination.[190] The regulations end with greatly detailed shipping container specifications[191] and tank car standards.[192] It must be understood that violations of any of the rules under 49 C.F.R. § 171 are punishable by criminal fines and/or imprisonment.[193] Further similar regulation of transportation is accomplished by way of aircraft rules concerning the transport of pesticides and food or feed.[194]

In addition to land and air carriers, the Carriage of Goods by Sea Act[195] has some relevance to the transport of dangerous articles in vessels. Any goods of a dangerous character which have been shipped at sea without due notice to and consent of the carrier, master or agent of the carrier "may at

181. 49 C.F.R. § 177.800 (1968).
182. 49 C.F.R. § 177.814 (1968).
183. 49 C.F.R. §§ 177.815, .816, .823 (1968).
184. 49 C.F.R. §§ 177.821(c), 172.5 (1968).
185. 49 C.F.R. § 177.841(a) (1968).
186. 49 C.F.R. § 177.841(b), (c) (1968).
187. 49 C.F.R. § 177.848 (1968).
188. 49 C.F.R. § 177.860 (1968).
189. *Id.*
190. 49 C.F.R. § 177.860(a)(1) (1968).
191. 49 C.F.R. §§ 178.1 to 178.343-7 (1968).
192. 49 C.F.R. §§ 179.1 to 179.500-18 (1968).
193. 18 U.S.C. § 834(f) (1964).
194. 14 C.F.R. § 103.35 (1968); 49 U.S.C. § 1472(h) (1964).
195. 46 U.S.C. § 1300 (1964).

any time before discharge be landed at any place or destroyed or rendered innocuous by the carrier without compensation . . . ."[196] The shipper is liable for damages and expenses arising or resulting from such shipment when due notice or consent were not given or secured.[197] If, however, such dangerous goods are shipped with notice or consent, such destruction or rendering innocuous without liability is permissible when the articles "become a danger to the ship or cargo . . . ."[198] It is well to note that neither the carrier, nor the master is responsible for any loss or damage arising or resulting from "wastage in bulk or weight or any other loss or damage arising from inherent defect, quality, or vice of the goods . . . ."[199] Also, the carrier may agree with the shipper as to any terms concerning particular goods and the carrier's responsibilities and obligations toward them.[200]

To supplement these laws, the United States Coast Guard has enforcement powers concerning any maritime or other statute of the United States.[201] The authority of the Coast Guard extends to the high seas and waters over which the United States has jurisdiction.[202] The Coast Guard has been given new power in connection with pesticide contamination by way of amendments to its dangerous cargo regulations.[203] New regulations have clarified the rule that dangerous cargo must be stored "away from" foodstuffs.[204]

There are other federal and state laws which are designed to alert the user as to the proper storage of pesticides. The Interpretations of the Regulations for the Enforcement of the Federal Insecticide, Fungicide and Rodenticide Act state that:

> When an economic poison [pesticide] is intended for use on or around feed or food products and contamination with harmful residues may occur, the label should bear specific statements adequate to avoid danger of contaminating such feed or foodstuffs.[205]

Appropriate labels are also required in food handling establishments.[206] Most pesticides are required by the Regulations to have food or feed-oriented

196. 46 U.S.C. § 1304(a)(b) (1964).
197. *Id.*
198. *Id.*
199. 46 U.S.C. § 1304(a)(2)(m) (1964).
200. 46 U.S.C. § 1306 (1964).
201. 33 U.S.C. §§ 2.05 to 5.0 (1964).
202. *Id.*
203. 46 C.F.R. §§ 146.25-.45(i), .50(a), 200 (1968).
204. 46 C.F.R. § 146.25-.45(j) (1968).
205. 7 C.F.R. § 362.116(c)(2) (1968).
206. *Id.*

labeling which includes warnings not to store near or contaminate those products.[207] However, such economic poisons as chloropicrin, coaltar creosote, the cyanides, dalapon, 2,4-D, ferban, thiodan, maneb, mercury, methyl bromide, TEPP, warfarin and zineb, as well as others, require no specific acceptable labeling concerning the storage near or contamination of food or feed.[208] Even though several of these are highly toxic compounds and have, under the Interpretations, certain detailed precautionary statements suggested for use on their labels, there are no suggestions as to food or feed contamination or proximity warnings. While manufacturers are obligated "to use any added warning, caution or antidote statements which any special characteristics or uses of his formulation indicate to be necessary,"[209] there is no assurance that the possibility of spillage of leakage on feed or food will be covered by such additional warnings.

Other regulations concerning pesticides and food are those in the Federal Food, Drug and Cosmetic Act (FDCA) which set tolerances for pesticide chemicals in or on raw agricultural commodities.[210] Also, the regulation of food additives has some importance in this area.[211] The tolerance concepts in the pesticide residue regulations are important ones to consider when there may be legal implications in a contamination poisoning. While the spirit of the tolerance system is meant to dictate and limit the commodity residues which occur by way of natural agricultural pest control activities, those food or feed products which are contaminated in transit may also violate tolerance requirements and subject shipments to seizure and condemnation proceedings as well as other penalties for adulteration.[212] Also, the FDCA may come into effect if food is adulterated by spillage of pesticides while in a warehouse. If the food remains in an unopened package, it may still be in the stream of interstate commerce and thus subject to the adulteration and seizure sections of the Act.

C. State Laws Concerning the Transportation of Pesticides

State action generally has not been taken to meet the potential hazards of pesticide contamination of other commodities in transit, regardless of the more numerous means by which safe shipment could be enforced on the state level. Rules concerning commerce are the most ideal avenue for enforcement.

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207. 7 C.F.R. § 362.116(d) (1968).
208. *Id.*
209. *Id.*
210. 21 U.S.C. § 346a (1964); 21 C.F.R. § 120.1 (1968).
211. *See* 21 U.S.C. § 348 (1964).
212. 21 U.S.C. § 334 (1964).

Seventeen states have adopted rules and regulations designed after or corresponding to the federal regulations governing dangerous materials. These rules could be amended easily to correspond further with the interstate safeguards enacted early in 1968.[213] State rules and regulations dealing with food adulteration and tolerances may be another means by which safe carriage of pesticides might be accomplished. Finally, pesticide use and application laws, peculiar generally to the states, are other fertile areas for legislation designed to encourage the proper shipment of dangerous materials.

Some of the state laws in the last category already have emphasized the safe storage of insecticides, fungicides, rodenticides and especially herbicides. Several states have rules regarding the storage of herbicides away from seeds, fertilizer and vegetation. Other states are more explicit as to the potential dangers to human and animal well-being by improper storage. Although these laws have great merit, they do not consider pesticide contamination in intrastate commerce. Some aerial applicator laws encourage safe transport of pesticides with the view of safety in relation to the applicator himself. However, these regulations do not consider the problem of safe in-transit handling of dangerous articles with respect to their contaminative effect.

It would appear, therefore, that the most logical means of control on both a pragmatic and a jurisdictional plane is to amend intrastate commerce rules already in effect. Where there are no dangerous material sections in a state's transportation legislation, support of effective rules through existing pesticide control laws may be more desirable than legislating anew in the transportation area.

D. The Need for International Control

As a general rule, fatalities are not common if treatment is begun as quickly as practicable. Most fatalities have occurred in patients who were very young or very old and feeble. Other fatalities have been due to a number of factors beyond the obvious explanation of massive doses, such as, complete lack of or inadequate medical attention, incorrect or incomplete diagnosis, late recognition of symptoms and severe complications or unusual circumstances with particular patients.

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213. The following states have regulations similar to those in 49 C.F.R., but none have, as of yet, adopted the new regulations: Arkansas, Arizona, Florida, Idaho, Missouri, Nevada, North Carolina, Oregon, Tennessee, Washington, Wyoming, Rhode Island, California, Nebraska, Colorado, Utah and New Mexico. The regulations, for the most part, are much less stringent than the federal counterparts.

More detailed and extensive state rules and regulations may also be needed, however, to prevent injury and loss of life. Regulations on an intrastate basis revising storage and stowage plans and locations in vessels, rail cars and motor carriers may be desirable. Packing and securing methods and techniques should be designed to lessen the possibility of spillage when rough and unsteady in-transit conditions are reasonably expected to be encountered. New rules concerning safe loading and unloading of dangerous substances may also become a practical necessity. Regulations requiring immediate examination of surrounding commodities once leakages or spillages are discovered can minimize the development of tragedies. Insurance inspectors, warehousemen and those responsible for the goods in transit must be required to report such occurrences to health officials immediately. Inspections before shipment of food and feed stuffs and after shipment of pesticides may serve to avert undiscovered hazards. More up to date and detailed information concerning pesticides and their contaminative effects must be made available for official listing, marking and creating of packing specifications. It is also evident that these safeguards must be instituted not only on the state level in the United States, but also, by way of treaty or agreement, on the international level and within the boundaries of other countries themselves.

Federal reaction to inadequate legislation has been swift in the face of the recent rash of pesticide spillages. Greater awareness of the hazards has thus led to the new safety amendments to the Hazardous Materials Regulations of the Department of Transportation. The new restrictions deal with class B insecticides and their proximity to food and feed. Also, "because of the multiple uses of transportation equipment, it [was] considered necessary to place a restriction on the reuse of 'such' equipment which has been contaminated by the leakage of poisonous liquids or solids . . . until the contamination has been removed . . . ."[214]

As the popularity and use of pesticides grow in underdeveloped countries, the possibilities of incidents of pesticide contamination on board ocean-going vessels or carriers within those nations and subsequent poisoning become more likely. So far, incidents of this sort have been worse in underdeveloped countries, but they have also happened in the more highly developed areas. The most efficient methods of developing laws to handle this situation may be devised first by improving state and local regulations in the United States after the federal example and then developing international accord on safety rules among those countries with active merchant fleets

214. 32 Fed. Reg. 20982 (1967).

and trading activities.[215] Such legislation could also present an excellent guide for future foreign control of carriers within their own boundaries.

V. Conclusion

Existing pesticide laws and common law principles applicable to the use of pesticides do a reasonable job of protecting persons and property from injury. However, we should not be satisfied with the laws as they stand. Improvement is necessary in the administration of present controls. The development of some further regulation by way of statutes and rules may be necessary in some instances before adequate, useful and practical means are made available, thus minimizing pesticide accidents. Statutory control should not only regulate, restrict and make unlawful certain acts and procedures but also should serve as educational tools to enlighten users, sellers, applicators and shippers. Statutes which merely prohibit do serve a useful purpose. The reasons for limits on individual activitiy are not always obvious to the affected or regulated parties. Statutory language, while not necessarily explanatory, should be detailed enough to point out the proper means of compliance. Above all, legislative control must be reasonable, workable and enforceable.

It will take years of hard work to obtain relatively uniform and comprehensive pesticide labeling, transportation, use and application legislation. However, liberal access to the courts and favorable decisions for plaintiffs indicate a fertile area of extension of present common law remedies. If legal action, or more important, the initial injuries to persons and property, can be avoided by increased statutory control, more support for this legislation must be generated. The pesticide legal problem must be confronted intelligently and vigorously.

This is an age of rapid scientific advances. The speed of advancement necessitates the development of responsibility. The concern which exists in the prevention of poisoning depends to a large extent upon this sense of responsibility. Advances in the control of communicable disease afford an opportunity to attack other health problems, such as pesticide injuries and deaths, which for some years have received little attention. Fortunately, responsibility in the use of pesticides has paralleled to some extent their introduction into industry and agriculture. Otherwise the pesticide safety record would have deteriorated rapidly instead of improving slowly or remaining static.

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215. Great Britain has extensive rules concerning dangerous articles on vessels. *See* Board of Trade, Carriage of Dangerous Goods in Ships (1966).

The means for preventing injury by pesticides must be based on a knowledge of their physical, chemical and biological properties. Once complete research has been accomplished, appropriate safety measures may lead to the establishment of new legal standards or amendments to existing statutory controls. A proper attitude among society in general can be propogated by education and programs designed to communicate the results of research.

Appendix A. State Pesticide Laws

State	*Registration Laws*	*Use and Application Laws*
CODE OF ALA. (1960)	§ 2-337(3) (Insecticide, Fungicide and Rodenticide Act, 1951)	
ALASKA		
ARIZ. REV. ST. ANN. (1956)	§ 3-341 (Pesticide Act, 1956)	§ 3-371 (Pest Control Applicators Act, 1953)
ARK. ST. ANN. (1958)	§ 77-201 (Economic Poisons Act, 1947)	§§ 77-214 to 26 (Agricultural Application Service Licensing Law, 1961) §§ 77-1801 to 11 (Pest Control Law, 1965)
CALIF. (DEERING, 1967)	CAL. AGRIC. CODE §§ 12811-26 (Economic Poisons) CAL. AGRIC. CODE §§ 14001-98 (Injurious Materials)	CAL. AGRIC. CODE §§ 14031-35 (Injurious Herbicides 1964) CAL. AGRIC. CODE §§ 11701-92 (Pest Control Business 1961) CAL. BUS. & PROF. CODE § 8500 (Structural Pest Control Act, 1963)
COLO. REV. ST. (1963)	§§ 6-12-1 to 6-12-12 (Insecticide and Rodenticide Act, 1947)	§§ 6-14-1 to 6-14-14 (Custom Applicators Law, 1961)
GEN. ST. CONN. (1958)	§§ 19-300(a) to (v) (Pesticide Law, 1963)	§ 23-61 (Tree Expert Law, 1949) §§ 19-300(k) to (v) (Custom Applicators Act, 1963)
DELAWARE		
FLA. ST. ANN. 1964)	§§ 487.01-.12 (Pesticide Act, 1953, revised 1966)	§§ 482.011-.25 (Structural Pest Control Act, 1959) § 482.051 (Regulations of Board of Health, 1965)

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Appendix A. State Pesticide Laws—(Cont'd)

State	*Registration Laws*	*Use and Application Laws*
GA. CODE ANN. (1962)	§ 5-1501 (Economic Poisons Act, 1962)	§ 84-3401 (Structural Pest Control Act, 1962)
REV. LAWS HAW. (1963)	Tit. 3 §§ 25-1 to -9 (Economic Poisons Act, 1963)	Tit. 3 §§ 27-1 to -13 (Herbicide Sale and Use Act, 1963)
IDAHO CODE (1968)	Ch. 34 § 22-3401 (Economic Poisons Act, 1968)	Ch. 34 §§ 22-2207 to -2230 (Commercial Sprayer's and/or Duster's Law, 1968)
ILL. ANN. ST. (1962)	Ch. 5 § 87(c)(1) (Economic Poisons Act, 1966)	Ch. 5 § 87(a)(1) (Herbicide Law, 1966) Ch. 5 § 87(d)(1) (Custom Application of Pesticides, 1966)
BURNS IND. ADMIN. RULES & REGS. (1967)		§ 14-109(2) (Regulations No. 2 Aeronautics Comm. of Ind., 1967)
IOWA CODE ANN. (1949)	§ 206.1 (Pesticide Act, 1949)	§ 206.1 (Pesticide Act, 1949)
KAN. ST. ANN. (1964)	§§ 2-2201 to -2215 (Ag. Chemical Act, 1964) §§ 47-501 to -515 (Livestock Remedy Law, 1964)	§§ 2-2401 to -2412 (Pest Control Act, 1964) § 3-901 (Ag. Spraying and Dusting Act, 1964)
KY. REV. ST. (1962)	§§ 217.540-.640 (Economic Poisons Law, 1962) §§ 217.005-.215 (Food, Drug, and Cosmetic Law, 1962)	§§ 249.250-.350 (Kentucky Structural Pest Control Act, 1962)
LA. REV. ST. (1951)	§§ 3-1601 to -1608 (Pesticide Act, 1951)	§ 3-1622 (Custom Application of Pesticides, 1964) § 40-1261 (Structural Pest Control Law, 1965)
ME. REV. ST. ANN. (1964)	Tit. 7 § 581 et. seq. (Economic Poisons Law, 1964)	Tit. 7 § 584 et. seq. (Regulation of Pesticides, 1964)

Appendix A. State Pesticide Laws—(Cont'd)

State	*Registration Laws*	*Use and Application Laws*
ANN. CODE OF MD. (1965)	Art. 48 § 129-39 (Pesticide Law, 1965)	
ANN. LAWS MASS. (1967)	Ch. 94B §§ 11-22 (Pesticide Law, 1967) Ch. 94B §§ 1-10 (Hazardous Substance Labeling Law, 1967)	Ch. 94B § 21C (Pesticide Board Rules and Regulations, 1967)
MICH. ST. ANN. (1967)	§ 12.352(1) et. seq. (Insecticide, Fungicide and Rodenticide Act, 1967)	§ 12.353(1) et. seq. (Custom Applicator Law, 1967)
MINN. ST. ANN. (1963)	§§ 24.069-.23 (Economic Poisons and Devices Law, 1963) §§ 18.031-.035 (Spraying and Dusting Machines, 1963) § 24.33 (Hazardous Substance Labeling Act, 1963)	§ 18.032 (Custom Applicator Law, 1963)
MISS. CODE ANN. (1957)	§§ 5000-01 to -14 (Economic Poisons)	§§ 5000-21 to -33 (Crop Spraying by Aircraft, 1957) §§ 5006 to 5011 (Professional Services, 1957) Ag. Aviation Licensing Act (1967)
ANN. MO. ST. (1966)	§ 336.090 (Economic Poisons Act, 1966)	
REV. CODE MONT. (1947)	§§ 27-201 to -212 (Economic Poisons Act, 1958)	
REV. ST. NEB. (1962)	§§ 2-2601 to -2611 (Economic Poisons and Devices Act, 1962)	
NEV. REV. ST. (1967)	Tit. 51 §§ 586.010-.450 (Economic Poison Law, 1967)	Tit. 51 §§ 555.260-.460 (Custom Application of Economic Poisons, 1967)

Appendix A. State Pesticide Laws—(Cont'd)

State	*Registration Laws*	*Use and Application Laws*
N.H. Rev. St. Ann. (1955)	§§ 438.1-.17 (Economic Poisons Law, 1955) § 339-A.2 (Hazardous Substances Labeling Act, 1955)	§§ 149-D.1 to -D.11 (Pesticide Control Law, 1964)
N.J. St. Ann. (1959)	§ 4:8A-1 et. seq. (Economic Poison Act, 1959)	
N.M. St. Ann. (1966)	§ 45-9-1 to -9-12 (Economic Poison Act, 1966)	§§ 67-34-1 to -34-7 (Pesticide Applicators Law, 1961)
N.Y. (McKinney, 1954)	§§ 148-51 (Pesticide Law, 1954)	§ 151H (Pesticides in Grape Vineyards Law, 1954) Custom Applicators Act (1968)
Gen. St. N.C. (1966)	§§ 106-65.1 to -65.21 (Insecticide, Fungicide, and Rodenticide Act, 1966)	§§ 106-65.13 to -65.21 (Aerial Crop Dusting Law, 1966) §§ 106-65.22 to -65.35 (Structural Pest Control Act, 1966)
N.D. Cent. Code Ann. (1960)	§§ 19-18-01 to -18-11 (Insecticide, Fungicide, and Rodenticide Act, 1960) §§ 19-14-61 to -14-08 (Livestock Medicine Law, 1943)	§ 28-01-40 (Pesticides Damage Claim Act, 1960) § 2-05-18 (Aerial Spraying Licensing Act, 1959)
Ohio Rev. Code (1954)	§§ 921.06-.99 (Economic Poisons Act, 1954) §§ 923.21-.34 (Livestock Remedies Act, 1954)	Control Measures for Herbicides (rev. 1967)

Appendix A. State Pesticide Laws—(Cont'd)

State	*Registration Laws*	*Use and Application Laws*
OKL. ST. ANN. (1964)	Tit. 2 §§ 3-61 to -70 (Pesticides Law, 1964)	Tit. 2 §§ 3-81 to -88 (Pesticides Applicator Law, 1964) Tit. 2 §§ 3-271 to -279 (Ornamental Spraying or Pruning, 1964) Tit. 2 §§ 3-251 to -258 (Phenoxy Herbicides, 1964) Tit. 2 §§ 3-161 to -190 (Structural Pest and Termite Control Law, 1964)
ORE. REV. ST. (1967)	§§ 453.010-.160 (Sale of Poisons and Other Dangerous Substances, 1967) §§ 634.211-.990 (Standards and Labels for Agricultural Chemicals, 1967)	§§ 573.001-.585 (Control of Application of Agricultural Chemicals, 1967)
PENN. ST. ANN. (1963)	Tit. 3 §§ 111.1-.12 (Pesticide Act, 1963)	
R.I. CODE (1957)	§§ 2-8-1 to -8-28 (Economic Poisons Law, 1957)	§ 23-41-4 (Custom Applicators Act, 1957)
CODE OF LAWS S.C. (1962)	§§ 3-101 to -185 (Economic Poisons Law, 1962)	
S.D. CODE (1960)	§§ 22.12A-.12A11 (Insecticide, Fungicide, and Rodenticide Act, 1960) § 22.12 (Poison Law, 1960)	§ 22.12B (Applications of Economic Poisons from Aircraft, 1960)
TENN. CODE ANN. (1964)	§§ 43-701 to -713 (Insecticide, Fungicide, and Rodenticide Act, 1964)	§§ 43-515 to -526 (Plant Pest Act, 1964) §§ 43-609 to -618 (Insect Pests, Rodents, and Plant Diseases—Control and Eradication, 1964)

Appendix A. State Pesticide Laws—(Cont'd)

State	*Registration Laws*	*Use and Application Laws*
TEX. CIV. ST. (1958)	§ 135B-5 (Insecticide, Fungicide, and Rodenticide Act, 1959)	§ 135B-4 (Herbicide Law, 1959)
UTAH CODE ANN. (1953)	§§ 4-4-1 to -4-15 (Insecticide, Fungicide, and Rodenticide Act, 1953)	§§ 4-4-16 to -4-28 (Economic Poison Application Act, 1953)
VER. ST. ANN. (1958)	Tit. 6 § 911 (Insecticide, Fungicide, and Rodenticide Act, 1958)	
VA. CODE (1966)	§§ 3-189 to -249 (Insecticide, and Rodenticide Act, 1966)	
REV. CODE WASH. ANN. (1962)	§§ 15.57.010-.57.930 (Agricultural Pesticide Act, 1962)	§§ 15.57.010-.57.930 (Agricultural Pesticide Act, 1962) §§ 17.21-.21.930 (Pesticide Application Act, 1962)
W. VA. CODE (1966)	§ 19-16A(1-13) (Pesticide Act, 1966)	
WIS. ST. ANN. (1957)	§§ 94.67-.71 (Pesticide Law, 1957)	
WYO. ST. ANN. (1959)	§§ 35-254 to -262 (Economic Poison Law, 1959)	§ 10-4 (Aerial Spraying Registration Regulation, 1959)

Senator MONDALE. We stand adjourned until tomorrow morning at 9:30.

(Whereupon, at 12:40 p.m. the committee was recessed, to reconvene at 9:30 a.m. Tuesday, September 30, 1969.)

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